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Assessing the Returns to Education in Georgia

by

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ABSTRACT

The economic returns to education in transition countries have been extensively evaluated in the literature. The present study contributes to this literature by estimating the returns to education in Georgia during the last transition period 2000–04. We find very low returns to education in Georgia and little evidence of an increasing trend in the returns. This picture contrasts with somewhat higher rates of return to education in the mid-1990s in Georgia and the recent estimates from other transition countries. A further analysis of the shifts in the supply and demand for education sheds light on possible causes. In particular, on the supply side, the decline in the quality of education in the 1990s has negated the improvements in the provision of skills needed by market economies during this period. On the demand side, the expansion of the Georgian economy has taken place in the direction of fields such as public administration and education that employ a highly educated workforce but do not remunerate well. Yet it would be a mistake to conclude that education is not a valuable asset in Georgia. The role of education is largely manifested in its impact on the employability of individuals, an issue that has been overlooked in the transition literature. Once this impact is taken into account, education is shown to play an increasingly important role in influencing the earnings of the working population in Georgia. The paper uses the ordinary least squares approach, instrumental variables approach, and sample selection correction, taking into account conditional and unconditional marginal effects of education on earnings.

Keywords: Returns to Education; Human Capital; Sample Selection; Instrumental Variables; Transitional Economies; Georgia

JEL Classifications: I21, J24, P2

1. INTRODUCTION

The collapse of the socialist bloc initiated an unprecedented transformation of the countries of Central and Eastern Europe and former Soviet Union. As these countries embarked on the transition course from socialist to market-based economies, a key element, which at the time was viewed to be the guarantor of their success, was their highly educated workforce. Yet, twenty years later, on almost all grounds, former Soviet Union countries lag behind Central and Eastern European (CEE) countries. Arguably, the successful utilization of the skills of the labor force and the creation of incentives for their further development have contributed to the superior performance of the CEE countries.

Vast literature has studied the incentives for human capital accumulation existing in Central and Eastern European countries (for cross-country analysis and meta-surveys, see Fleisher, Peter, and Wang and [2005] and Flabbi, Paternostro, and Tiongson [2008]). The research on the former Soviet Union has largely focused on Russia (e.g., Brainerd 1998; Cheidvasser and Benitez Silva 2007; Vernon 2002) and the western republics of the former Soviet Union (e.g., Pastore and Verashchagina [2005] for Belarus; Gorodnichenko and Sabirianova Peter [2005] for Ukraine). Exceptions are Arabsheibani and Mussurov (2007), who analyze the evidence for Kazakhstan, and Anderson and Pomfret (2003), who report the estimates for Kyrgyzstan.

The present study contributes to this expanding literature by considering the case of Georgia. It evaluates the late transition period, covering the years from 2000 to 2004, during which the Georgian economy experienced expansion, which was long needed after the stagnation of the 1990s. Our main point of interest is to evaluate the extent to which the educational attainment of the Georgian workforce has contributed to the increase in its earnings. To that end, we estimate the rates of return to education using the Mincerian earnings function. We test for and attempt to reduce potential biases in the education coefficient by proxying for omitted variables and by implementing instrumental variable estimation and the correction for sample selection bias. We first focus on the estimate of the education coefficient as a measure of the impact of education on earnings. Doing so allows us to place the Georgian results in the context of the transition literature. However,

as several recent studies emphasize, in the context of the sample selection corrected results, the appropriate measure for comparison is the conditional marginal effect of education on the log of earnings. This measure takes into account the impact of education on the probability of losing employment for the currently employed category. Finally, we estimate the unconditional marginal effect, which evaluates the impact of increased education on the earnings of all working individuals, taking into account the change in the worker-employment ratio.

The findings of this paper suggest that educational attainment of the Georgian workers has contributed little to their earnings: the returns to education in Georgia are very low compared to other transition countries. Moreover, despite the expansion of the Georgian economy, there is no evidence of an increasing trend in returns during 2000–2004. A more careful look at the supply of education reveals that the decline in the quality of education in 1990s has negated the improvements in the provision of skills needed by market economies. On the demand side, the expansion of the Georgian economy has taken place in the direction of industries that employ a highly educated workforce, but that do not remunerate well. These forces of supply and demand appear to have contributed to the presence of low returns to education and to the lack of an increasing trend. This is a disturbing development in so far as the lack of incentives for investing into education will deplete the skill level of the workforce, jeopardizing Georgia's long-term economic potential. Yet, it would be a mistake to conclude that education is not a valuable asset. The role of education in Georgia is manifested in its impact on the employability of individuals, an issue which has been overlooked in the transition literature.[2] Once this impact is taken into account, education is shown to play an increasingly important role in influencing the earnings of the working population in Georgia.

The rest of the paper is structured as follows. Section 2 provides the background for the developments in Georgia's output composition, the state of its educational system, and a brief review of the relevant studies. Section 3 presents the dataset and summary

[2] The positive impact of education on the probability of employment has been evaluated for a number of European countries (e.g., Harmon, Oosterbeek, and Walker [2001]—cited in Arrazola and de Hevia [2008]).

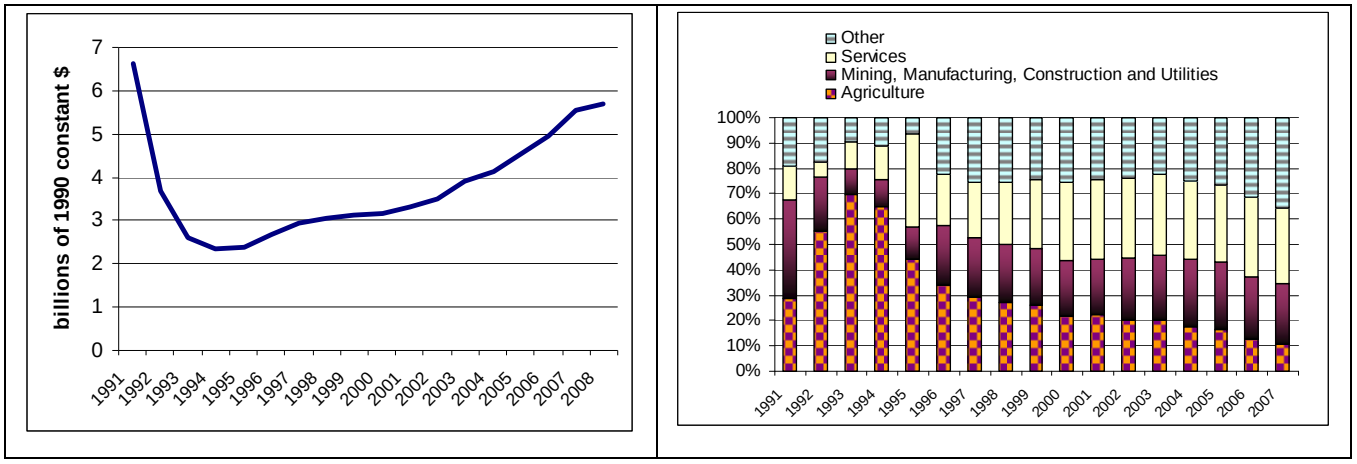
statistics. Section 4 describes the variables and presents the methodology, followed by the results in section 5. Section 6 provides the analysis of the results; section 7 concludes.

2. BACKGROUND

2.1 Economy

The 1990s were marked by a sharp decline in the standards of living in Georgia. Between 1991 and 1995, the Georgian GDP shrank from $6.64 billion to $2.4 billion, in 1990 constant dollars. Since then the Georgian economy has grown; however, fifteen years later it still has not reached its pre-1991 GDP levels.

Figure 1: Trends and Composition of the Georgian GDP



Source: UNESCO UIS Data and Georgian Department of Statistics

Although the importance of agriculture has declined, it remains a key industry in Georgia, contributing 11% of the GDP in 2008. Service industries have expanded, led by the trade sector, which contributed 16.06% of the GDP, and public administration and defense which contributed 17.26% of the GDP in 2008.[3] More recently, communications,

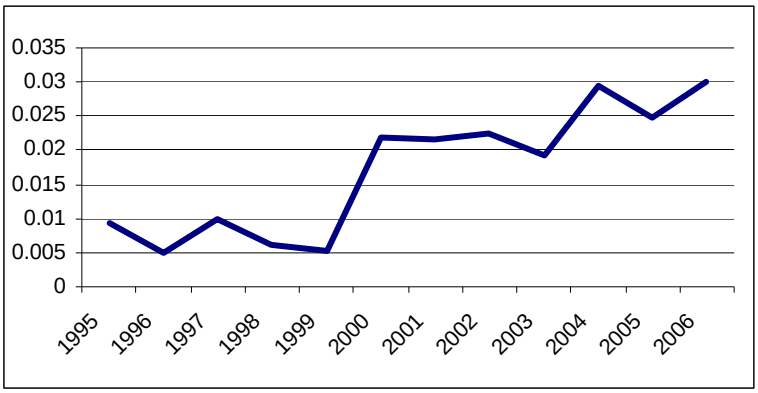
[3] Services include wholesale and retail trade; hotels and restaurants; and transport, storage, and communications (ISIC G–I). Public administration and defense are included in the *Other* sector, which also includes financial intermediation, real estate, education, health, and other community service activities (ISIC J–P).

transportation, and financial sectors have grown, although their contribution to the GDP remains low.[4]

2.2. Education

Simultaneous developments took place in the educational system in Georgia. The state financing of education dropped to 0.5% of GDP in 1999. It has since increased, reaching 3% in 2008, however this level remains well below the average for countries at a similar level of development.[5] As a result, the quality of education in Georgia suffered. At the primary and secondary levels, the unavailability of textbooks and school materials, especially in rural areas, as well as the deferral of building maintenance and reductions in teacher salaries became endemic (Vandycke 2001). One study finds that low wages have led some teachers to withhold important material during their regular class-time. This was done so that they could tutor their students in order to receive additional pay after class, and that, too, "with as little effort as possible" (Steiner-Khamsi and Harris-Van Keuren 2008: 6).

Figure 2: State Education Financing as a Proportion of the Georgian GDP



Source: UNESCO UIS and Georgian Department of Statistics

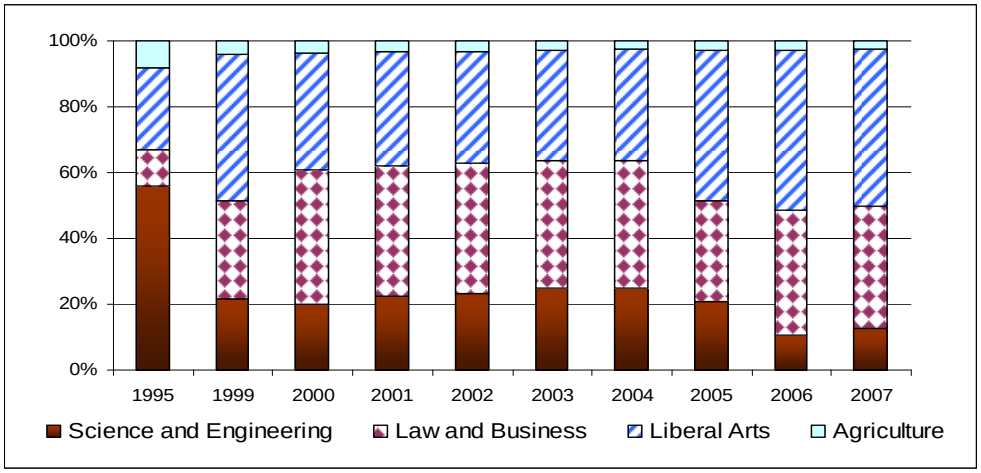
[4] DOS and UN data are consistent with each other, but DOS numbers are more detailed, hence I rely on them in this part of the analysis.

[5] As a comparison, the average of OECD countries in 2008 was 6.1% and the average for OECD member or partner transition countries in 2005 was 5.1%. These numbers are however comparable to Russia, where education spending increased from 2.9% of its GDP in 2000 to 3.8% of its GDP in 2005 (OECD 2008).

At the tertiary level, throughout the 1990s and as late as 2004, the majority of higher educational institutions lacked necessary facilities and qualified staff. A study conducted by the Georgian Ministry of Education in 2004 concluded that out of 178 licensed higher education institutions, only 78 met the minimum requirements for personnel and facilities (cited in Pachuashvili [2007]). Up until the most recent wave of educational reforms was initiated in 2004, corruption was widespread at all levels of educational attainment (Lorentzen 2000).

In addition to the changes in quality, the composition of education has changed, as well. Since 1990s we have observed a drop in the proportion of students enrolled in science and engineering from 56% in 1995 to 14% in 2007. The opposite happened to the proportion of students enrolled in business, law, and economics, which increased from 11% in 1995 to 42% in 2007. These shifts are indicative of the gradual transition away from a heavy Soviet emphasis on industrial skill acquisition towards the broader needs of a market-based economy, including service- and management-oriented occupations.

Figure 3: Composition of Enrollment by Subjects

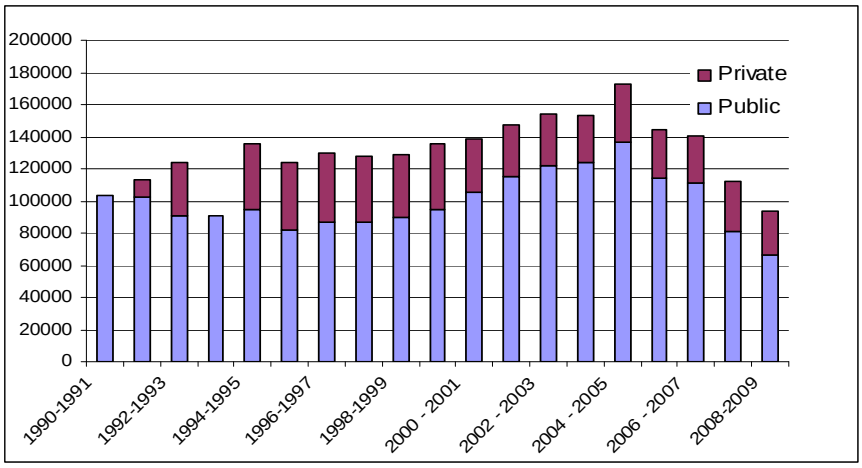


Source: UNESCO UIS

These adjustments were made possible by the passing of the law allowing the establishment of private educational institutions in 1991. As a result, that very year, 48 private higher education institutions were established, enrolling 10,633 students. By the

following year, there were 131 private institutions, enrolling 33,063 students[6] (Department of Statistics; Pachuashvili 2007).[7] Enrollments reached a peak during 2004 and have since declined to below the 1990 level.

Figure 4: Number of Enrolled Students in Private and Public Higher Education Institutions



Source: Georgian Department of Statistics

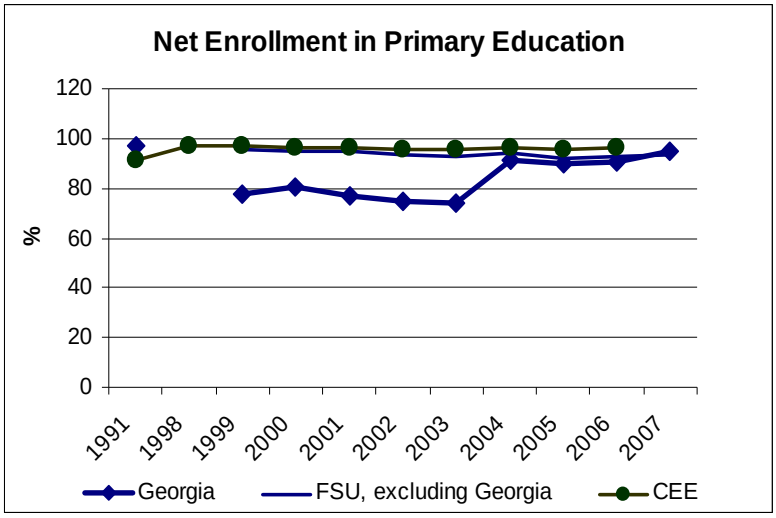
Enrollments at the primary levels have changed, as well. The net enrollment ratio in primary education[8] deteriorated sharply between 1991 and 2003 compared to middle- and high-income countries. In fact, as can be seen from figure 5, Georgia experienced one of the worst declines in the primary enrollment in all of the countries of the former Soviet Union and Central and Eastern Europe.

[6] By comparison, the enrollment in state higher education institutions dropped from 102,818 students in 1991 to 90,909 students in 1992.

[7] The very sharp increase can also be attributed to the passing of the Law on Military Service, which allowed male individuals enrolled in higher educational institutions to defer their compulsory military service. More generally, Bernabe (2002) argues that the lack of employment opportunities was a significant contributor to the rise in the enrollment in higher education.

[8] Total enrollment is the number of pupils of the school-age group for primary education, enrolled either in primary or secondary education, expressed as a percentage of the total population in that age group. Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.

Figure 5: Net Enrolment Ratios in Primary Education



Several studies have evaluated the impact of education on labor market outcomes in Georgia. Yemtsov (2001) uses Household Budget Survey data from 1996 and 1997 to provide a comprehensive analysis of labor markets with a particular focus on income distribution and poverty. His findings emphasize the importance of nonmonetized transactions in alleviating the very high levels of inequality in monetary incomes in Georgia in mid-1990s. Relevant to this paper, Yemtsov evaluates an earnings function with levels of educational attainment and finds that, relative to incomplete secondary education, the returns to complete secondary education are about 35% and the returns to university education are about 50%. That is, the marginal benefit from university education is 15%.

Bernabe and Stampini (2009) evaluate labor market mobility in Georgia using the 1998 and 1999 data from the Labor Force Survey[9] and the Household Budget Survey. They find that individual characteristics matter in determining the mobility of individuals among labor statuses. Pertinent to our analysis, younger individuals are more likely to remain unemployed and find it more difficult to find a job once unemployed. Moreover, individuals with a university education are more likely to gain and stay in a formal job. This particular observation is critical in that it highlights the importance of education in

[9] These were the only two years when the LFS was conducted, providing the information necessary to conduct the analysis of labor mobility across five different types of employment statuses.

determining a labor force status and its stability over time, a result that will be echoed in our study.

3. DATA

The analysis is conducted using the data from the Georgian Household Budget Survey (HBS) for 2000–2004. Georgian HBS is a quarterly survey of 3,351 households, which follows a rotating panel design, adopted by World Bank's Living Standards Surveys (Deaton 1997). In this analysis, only the first quarter data from each year are used.

We restrict the sample to individuals 16 years or older and 64 years or younger for men and 59 years or younger for women in accordance with the legal retirement age of 65 years for men and 60 years for women.[10] We focus our attention on a sample of hired workers with positive income. We exclude unemployed individuals, self-employed individuals, and employed individuals earning zero income.[11] The group of hired workers constitutes 19.79% of the working-age sample. It bears emphasizing that hired employment constitutes a relatively small portion of overall employment in Georgia, with self-employed individuals being 37.22% of the working-age group and the remaining 42.99% being either inactive or unemployed. However, focusing on this group enables us to place our results in the context of the transition literature, in which almost all studies evaluate the returns to education for employees (Noorkoiv et al. [1998] is one exception; they include all types of employment). An equally important reason, however, is the finding that the labor market experience of self-employed individuals differs from the experience of hired workers and therefore merits separate attention (Garcia-Mainar and Montuenga-Gomez [2005], for evidence on Spain and Portugal). In particular, the levels of income underreporting tend to be much higher for self-employed individuals than for workers (Benedek and Orsolya 2009; Johansson 2001). In Georgia, Yemtsov (2001) finds

[10] In the sample of individuals above the retirement age, 822 (8.57% of the total number of individuals at or above retirement age) report being hired workers. Out of these 822 individuals, 72 report earning zero wages. The OLS, IV, and sample selection corrected results are robust to the inclusion of individuals above the retirement age.

[11] Employed zero-earning group constitutes 1.8% of the sample. Therefore, unlike other countries, wage arrears, in so far they mean zero wage income, are not a common occurrence (Cheidvasser and Benitez Silva 2007).

that during 1996 and 1997 income was underreported by as much as 46%.[12] Focusing on the sample of employees enables us to reduce the bias due to income underreporting.

Table 1: Characteristics of Respondents, 2000–2004

Variable	Working-age	Hired
Age (years)	36.75	41.51
Tbilisi[a]	.2547	.3806
Urban	.5171	.6886
Female	.5070	.4686
Married	.6263	.7083
Agriculture	.2669	.0279
Wage (in laris)	27.63	82.57
Education:		
Incomplete secondary	0.0813	.0288
Technical college	.2048	.2419
Complete secondary	.3772	.2057
Higher education or above	.2271	.4583
	1.00	1.00
Number of observations	6,166	31,154

Notes: [a] proportions unless noted otherwise

Table 1 presents the characteristics of respondents for the working-age group and for the hired-worker subsample analyzed in this study. A typical hired worker is about five years older, more likely to be a man, and more likely to live in urban area. This worker has higher level of education and earns more than three times as much as a typical working-age person. A typical hired worker is less likely to work in agriculture compared to a typical working-age person. These differences in the characteristics of individuals point to a need to account for a potential sample selection bias.

[12] By comparison, in 2005 in Hungary 11% of income was unreported, with self-employed not reporting 67% of their income.

In order to better understand the relationship between our key variable of interest —education—and other variables in the estimation, we explore how individuals with different educational attainment differ from each other. Our first finding is that the proportion of hired individuals in the working-age sample rises with educational attainment. Only 7.14% of individuals with an incomplete secondary education are hired workers. This number for individuals with a university education is 42.93%.[13] Individuals with a university education are much more likely to work in urban areas and much less likely to work in agriculture. Women are underrepresented in the category of hired workers with an incomplete or complete secondary education, but well-represented among individuals with a technical or university education. Finally, the earnings of hired workers with a university education are almost 50% higher than the earnings of workers with an incomplete secondary education. It remains to be seen how these differences in earnings by education will persist once we control for other characteristics.

Table 2: Characteristics of Respondents by Education, 2000–2004 (proportions)

	Hired workers/ Working age	Hired workers/ Employed	Urban	Agriculture	Female	Wages (laris)
Incomplete secondary	.0714 [a]	.1436	.5350	.1504	.3886	61.95
Complete secondary	.1103	.3717	.6332	.0544	.3315	79.30
Technical	.2442	.1924	.6422	.0232	.5028	71.09
University	.4293	.6737	.7597	.0120	.5118	92.58

Notes: [a]weighted proportions

Equally important is the look at how individuals employed in different industries differ from each other. Based on our sample, more than 20% of hired workers are employed in the education sector, followed by public administration, manufacturing, and trade. It is noteworthy that over 80% of the hired workers are employed in service-related sectors, including trade, hotels, finance, real estate, public administration, education, health, culture, and international organizations.

[13] This relationship also holds if we consider hired individuals as a proportion of the employed (hired + self-employed).

Table 3: Characteristics of Respondents by Industry (proportions)

Variable	Composition (%)	Hired workers/ Working age	Female	University	Urban	Wages (laris)
Agriculture	3.73	0.0240 [a]	0.1644	0.1958	0.2523	59.97
Mining	0.5	0.8611	0.1546	0.3622	0.6355	86.02
Manufacturing	10.95	0.7697	0.3108	0.3089	0.7106	100.62
Power	4.17	0.9885	0.1951	0.3288	0.6010	97.90
Construction	3.5	0.6034	0.0463	0.3269	0.7365	143.60
Trade	10.85	0.3202	0.4407	0.2695	0.7688	104.34
Hotels	2.11	0.8280	0.6118	0.2283	0.7379	109.14
Transport	8.38	0.6671	0.2477	0.2644	0.7002	119.87
Finance	1.82	0.9739	0.6143	0.6179	0.7736	122.33
Real Estate	3.47	0.9106	0.4258	0.5899	0.8168	93.97
Public Administration and Defense	16.12	0.9970	0.2816	0.5906	0.6815	72.02
Education	20.32	0.9882	0.8115	0.7209	0.5992	46.86
Health	8.25	0.9658	0.8162	0.4357	0.7438	45.12
Culture	5.22	0.8090	0.5127	0.4456	0.8139	69.92
Hired Services in Households	0.32	0.3636	0.9051	0.3364	0.8784	102.40
International Organizations	0.28	1.0000	0.4938	0.8626	0.7865	352.83
	100%					

Notes: [a] proportions unless noted otherwise

Close to 100% of individuals in public administration and defense, education, health, international organizations, and power industries are hired workers. On the other end of the spectrum is agriculture, in which only 2.4% are hired workers. These numbers highlight the need to evaluate the determinants of self-employment separately from the determinants of hired employment. We also note that education and health industries, as well as hired workers in households, are dominated by females. Construction, agriculture, mining, and power and utilities are overpowered by males. International organizations, as well as finance and education sectors, have the highest proportions of individuals with a university education. Agriculture is the only industry in which this value is below 20%. With the exception of agriculture, over 60% of employees in all sectors reside in urban areas. Finally, we observe a large variation in the earnings of workers in different

industries, with agriculture remunerating the least and international organizations paying the most.

4. VARIABLES AND METHODOLOGY

The *wage* variable is the monthly wage from main employment,[14] expressed in Georgian laris. The wages are actual rather than contractual and are adjusted for inflation using the CPI.

Education is measured as total years of education or as the levels of education, to account for the possibility of nonlinearity in the returns to education at different levels of schooling (for more discussion, see Trostel [2005]). Given the unavailability of actual years of education, the years of education are imputed from the data on the levels of education (Gorodnichenko and Sabirianova Peter [2005]; an important exception is Munich, Svejnar, and Terrell [2005]). *Experience* is proxied by Age–Schooling–6, following a common approach in the literature. This measure is admittedly problematic as we do not know how long currently employed individuals have in fact been employed.

To enable the comparison of the Georgian case to the studies of other countries, we first use ordinary least squares (OLS) to estimate a Mincerian earnings equation (Mincer 1974):

$$y_i = \beta S_i + X_i \alpha + e_i \qquad (1)$$

where subscript *i* denotes individual i, y_i stands for the log of inflation-adjusted actual monthly wages, S_i stands for schooling, β is the schooling coefficient, α is the vector of coefficients of variables included in X_i, and e_i is the error term. In the *basic* specification X_i includes the intercept, individual i's years of education, experience, experience squared, and female dummy. The *alternative* specification includes levels of education instead of the years of education. In the *extended* specification X_i includes, in addition,

[14] Wages are earnings from main employment. In the working-age group, 491 respondents (1.5% of the working-age sample) report earning income from a second job. The mean difference is 0.62 laris and is statistically different from zero at the 1% significance level.

marriage dummy, interaction term between female dummy and marriage, urban dummy, and regional dummy variables.

The consistency of the OLS coefficient estimates results depends on the absence of a correlation between the matrix of regressors and the error term *e*, that is E(*e*|*X*)=0. In the presence of nonzero correlation, the coefficient estimates are inconsistent (Card 1999 and 2001). Omitted variable bias is a common cause of correlation between the regressors and the error term. One way we deal with the bias stemming from the omission of potentially important variables is by proxying for them. However, in situations in which proxying for omitted variables is not possible or when the bias stems from the measurement error, the instrumental variable approach provides consistent estimates.

4.1. Instrumental Variables (IV) Approach

The objective of the IV estimation is to "extract" the portion of the information in the education variable, which is not correlated with the error term in the earnings equation, therefore reducing the bias. Although the intended benefit is the attainment of consistency, the IV approach is costly in that the loss of information results in the loss of efficiency. Therefore, the necessity of IV estimation must be carefully assessed.

We can specify the instrumental variables model with education S as the variables we are instrumenting for as a two-equation system, which includes the Mincerian model as one of the equations:

$$\begin{bmatrix} y_i \\ S_i \end{bmatrix} = \begin{bmatrix} \beta S_i + X_i \alpha \\ Q_i \delta \end{bmatrix} + \begin{bmatrix} e_i \\ \vartheta_i \end{bmatrix}, \qquad (2)$$

where ϑ_i is the error term in the first-stage regression, Q_i includes exogenous variables in X_i, and, in this case, at least one additional exogenous variable (the excluded instrument).

In order to obtain consistent results, an instrumental variable must be correlated with the endogenous variable (relevance) and it must be independent of the error term in the main equation (validity or excludability) (Baum, Schaffer, and Stillman 2002 and 2007; Murray 2006). There is a tradeoff between the relevance and the validity of an instrument. The greater the degree of correlation between the instrument and the

endogenous variable, the more similar the two are and the less likely it is that the instrument is uncorrelated with the dependent variable in the primary equation. Both conditions are critical. Bound, Jaeger, and Baker (1995) and Murray (2006) show that even when instruments are valid, if they are not relevant enough, the coefficient estimates are biased even in large samples, which defeats the purpose of using the IV estimation in the first place. Therefore, it is important to assess both the relevance and the validity of the instruments.

4.2. Sample Selection Model

Another potentially critical source of bias stems from the nonrandom selection into the sample. A preliminary look at the data suggests that the sample of hired workers is not representative of the population, rendering the inference about the returns to education potentially inaccurate. In order to evaluate the problem, we specify it in the form of a bivariate process that generates two latent variables y_i* and g_i*, where y_i* is the log of wage offers w_i and g_i* is the difference between the wage offer individual *i* receives, w_i, and this individual's reservation wage, $w^{res}{}_i$. The bivariate process is

$$\begin{bmatrix} y_i^* \\ g_i^* \end{bmatrix} == \begin{bmatrix} \beta S_i + X_i\alpha \\ Z_i\gamma \end{bmatrix} + \begin{bmatrix} \varepsilon_i \\ u_i \end{bmatrix}, \quad \begin{bmatrix} \varepsilon_i \\ u_i \end{bmatrix} \sim NID\left(0, \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}\right), \tag{3}$$

where S_i stands for schooling and X_i and Z_i are vectors of observations of exogenous variables; β is the schooling coefficient and α and γ are the corresponding coefficients of X_i and Z_i and ε and u are the error terms in the two equations; σ is the standard deviation of ε; and ρ is the correlation coefficient between ε and u. In Z_i we include schooling, exogenous variables in X_i, and at least one additional identifying variable (even though under the assumption of the joint normality of ε and u the above system of equation is identified even when Z_i includes schooling and the variables in X_i).

The observed variables are y_i and g_i such that

$y_i = y_i^*$ if $g_i^*>0$; $y_i=0$ otherwise;

$g_i = 1$ if $g_i^*>0$; $g_i=0$ otherwise.

This implies that wages are observed and equal wage offers only if the wage offer exceeds the person's reservation wage. If the wage offer a person receives is below this person's reservation wage, the wage offer is unobserved. As Davidson and MacKinnon (1993) point out, equation (3) can be rewritten in a one-equation form as:

$$y_i^* = \beta S_i + X_i\alpha + \rho\sigma u_i + v_i \,. \qquad (4)$$

If we replace y_i^* with y_i and u_i with its mean conditional on $g_i=1$ and on observed $Z_i\gamma$, we arrive at Heckman's form of regression (4) (Heckman 1976):

$$y_i = \beta S_i + X_i\alpha + \rho\sigma \frac{\phi(Z_i\gamma)}{\Phi(Z_i\gamma)} + residual_i \,, \qquad (5)$$

where $\frac{\phi(Z_i\gamma)}{\Phi(Z_i\gamma)} = \lambda_i$ is the inverse Mills ratio, which represents the probability of a employed person becoming unemployed.

The estimate of β from the OLS estimation of (5) is consistent. We will call it the sample selection corrected estimate. It can be interpreted as the mean effect of increased education on wage offers, whether they are observed or not. However, in many cases, the object of interest is the mean effect of increased education on observed wages, which is the conditional marginal effect of education on wages:

$$\beta_1 = \frac{\partial E(y_i \mid g_i^* > 0)}{\partial S_i} = \beta - \rho\sigma\gamma_s(\lambda_i^2 + \gamma`Z_i\lambda_i), \qquad (6)$$

where γ_s is the schooling coefficient in the selection equation.

The second term in expression (6) conditions the impact of education to the mean of the observed wages. It also underscores that the conditional marginal effect of education varies across individuals and depends on their characteristics (Greene 2000). The estimated values that we report correspond to the mean values of variables.

If ρ is zero or if γ_s is zero, β_1 and β equal each other. In most cases γ_s is positive, that is education increases the probability of becoming employed. Then the relationship between β_1 and β depends on the sign of ρ. Positive ρ implies that the unobservables that increase the likelihood of becoming employed also raise wages. Unobserved ability is one such example: more-able individuals are more likely to become employed and at the same time their earnings are, on average, higher than the earnings of less-able individuals. When ρ is positive, the conditional marginal effect is lower than the unconditional effect on wage offers. On the other hand, negative ρ implies that the unobservable characteristics that increase the likelihood of becoming employed reduce wages. Some studies argue, for example, that in circumstances in which employers have the leverage in setting wages, the probability of a person being hired depends on this person's willingness to accept lower pay (Nicaise 2001). In such circumstances, the conditional marginal effect will be higher than the unconditional effect on wage offers.

It is noteworthy that in the literature the biased OLS estimates are commonly compared to the sample selection corrected estimates of β, even though the appropriate measure is β_1 (notable exceptions are Arrazola and de Hevia [2008] for Spain and Hoffman and Kassouf [2005] for Brazil).

Equally valuable is the unconditional marginal effect of increased education on *observed* wage earnings. The unconditional marginal effect takes into account the impact of increased education on the probability that the currently unemployed or inactive individuals will become employed.[15] This is another measure that the literature assessing the impact of education in transition countries has not carefully considered. As Hoffman and Kassouf (2005) show, the unconditional marginal effect of increased education on mean earnings is:

[15] Note that in our specification this group also includes self-employed individuals.

$$\beta_2 = \frac{\partial \ln E(w_i)}{\partial S_i} = \beta_1 + \gamma_s \lambda_i \,. \qquad (7)$$

In this study we estimate and discuss all three measures: β, β_1, and β_2.

5. RESULTS

5.1 OLS Results

Table 4 presents the OLS results. All estimations are adjusted with survey weights. The basic specification of the Mincerian earnings function results in the rate of return to education of 0.0312, indicating that one additional year of education raises earnings by 3.12%. This value is very low compared to other transition countries. For Russia, using household-based survey data, Gorodnichenko and Sabirianova Peter (2005) obtain basic OLS estimates of 0.093 and 0.092 in 2000 and 2002. Vernon (2002) obtains the equivalent estimate of 0.085 for Russia in 2000. Clark uses a more inclusive specification and finds that the returns to education in 1998 in Russia were 0.1186. Using a different dataset—the International Social Survey Programme—Flabbi, Paternostro, and Tiongson (2008) obtain the basic OLS returns to education of 0.0785 for the late transition period covering 1997–2002, reflecting the robustness of the previous results for Russia. Using Kazakh household-based survey data from 2001, Arabsheibani and Mussurov (2007) find the returns to education of 0.08 for men and 0.115 for women. The results from Ukraine are more comparable to the Georgian case: Gorodnichenko and Sabirianova Peter (2002) report the estimates of 0.038 and 0.045 for 2000 and 2002.

An alternative specification that can enrich our understanding of the sources of returns includes the completed levels of education instead of the years of education in the estimation (table 4, column 2). The resulting OLS estimate of the returns to completed secondary education is .1548.[16] The corresponding estimate for completed technical education is .0876[17] and to completed tertiary education is .2753.[18] Hence the marginal

[16] The reference group is individuals with primary or incomplete secondary education.
[17] The F-statistic comparing the coefficient estimates of completed secondary and technical education is F(2, 5761)=3.54, p-value=0.0291.

benefit from acquiring a university education relative to a secondary education is only 0.1205. Compared to the results from 1996–1997 reported in Yemtsov (2001), returns to all levels of educational attainment have declined. In particular, using a more extended specification, Yemtsov (2001) finds that the rate of return to completed secondary education relative to incomplete secondary education is 0.35, whereas the rate of return to the university education is 0.50, yielding the marginal return of 0.15. At both secondary and tertiary levels, the decline in the quality of education is the likely culprit explaining why, despite the relatively strong performance of the Georgian economy during 2000–2004,[19] the returns to education dropped to such low levels. Note, however, that the marginal returns to a university education relative to a completed secondary education remained comparable.

Placing the Georgian estimates in the context of other former Soviet Union countries, Cheidvasser and Benitez Silva (2007) find that the return to a completed secondary education in Russia was 0.0567 and the return to a university education was 0.2842 during 1992–1999 (the marginal increase of 0.2275). Arabsheibani and Mussurov (2007) report the returns to a completed secondary education of 0.245 for men and 0.182 for women. The corresponding estimates for a university education are 0.646 for men and 0.806 for women, with the marginal increases of 0.401 and 0.624 for men and women, respectively. For Belarus, the findings of Pastore and Veraschagina (2005) indicate the return of 0.35 for a completed secondary education and 0.93 for a university education using 2001 data (the marginal return of 0.58). In sum, the current estimates of the returns to different levels of education in Georgia are lower than the Georgian estimates from 1990s and lower than the estimates from other transition countries for the similar period (with the exception of Russia). In addition, whereas the returns to education in other transition countries increase with educational attainment (possibly reflecting greater variability at the tertiary level), in Georgia during 1996–1997 and more recently during 2000–2004, the marginal returns to tertiary education appear to be lower than the

[18] The F-statistic comparing the coefficient estimates of completed secondary and university education is F(2, 5761)=13.09, p-value=0.0000.
[19] The average growth rate of GDP in constant 1990 prices was 3.61%.

marginal returns to secondary education.[20] We return to a more careful analysis of this question in the second part of the paper.

As it was already mentioned above, the omission of important variables can cause the coefficient estimates in the regression to be biased. Regional dummies are one group of potentially important variables. In this estimation, the sample is dominated by residents of Tbilisi, who make up 26.07% of the sample and who, on average, are more educated than residents of other regions. As a result, omitting regional dummies and therefore ignoring the regional sources of variation in wages skews upwards the education coefficient estimate.[21] Indeed including regional dummies (as well as marriage and the interaction term between marriage and gender) results in a statistically significant drop in the education coefficient estimate to 0.0111[22] (table 4, column 3). Earnings in all regions are found to be below the earnings in Tbilisi. However, there is evidence of substantial regional variability in wage earnings: in Qvemo Qartli wages are only 8% below wages in Tbilisi whereas this same differential for Samcxe Javaxeti is 72%.

The omission of a measure of quality of education and its composition is another potentially serious problem, influencing the experience coefficient in particular. The post-Soviet changes that took place in the quality of education and the composition of the Georgian educational system introduce two conflicting forces. On the one hand, because the quality of education received during the Soviet period was higher than the quality of education received during the 1990s (the period applicable to this analysis), the experience coefficient is likely to be *overestimated*. On the other hand, if the post-Soviet educational system provides skills more compatible with the running of a market-based economic system, the experience coefficient is likely to be *underestimated*. The inclusion of separate measures for the number of years of Soviet education and the

[20] This result runs is similar to the finding of decreasing returns to education in the vast majority of countries (Psacharopoulos and Patrinos 2004).
[21] Note however that the bias is reduced only when the introduced omitted variable is exogenous. Yemtsov (2001) points to the very limited regional mobility in Georgia, supporting the assumption of the exogeneity of regional dummies.
[22] The adjusted Wald test comparing education coefficient estimates in the basic and extended specifications is F(1, 26693)=109.79, p-value 0.0000. Also, the adjusted Wald test comparing all common coefficient estimates is F(7, 26687)=3.84, p-value=0.0004.

Table 4: Ordinary Least Squares Results

VARIABLES	Basic	Alternative (Levels)	Extended	Soviet and post-soviet	Old	Young
	(1)	(2)	(3)	(5)	(6)	(7)
Education	0.0312***		0.0111**		0.0115**	0.0106
	(0.005)		(0.004)		(0.005)	(0.018)
Secondary [a]		0.1548**				
		(0.069)				
Technical		0.0877				
		(0.068)				
University		0.2753***				
		(0.067)				
Soviet educ				0.0109**		
				(0.004)		
Post-Soviet educ				0.0166		
				(0.011)		
Experience	0.0030	0.0042	0.0036	0.0068	0.0065	-0.0321
	(0.005)	(0.005)	(0.004)	(0.007)	(0.006)	(0.039)
Experience2	-0.0001	-0.0002*	-0.0002*	-0.0002*	-0.0002*	0.0023
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Female	-0.6200***	-0.6146***	-0.4302***	-0.4305***	-0.3885***	-0.5192***
	(0.025)	(0.026)	(0.048)	(0.048)	(0.059)	(0.089)
Marriage			0.1924***	0.1933***	0.2231***	0.1797*
			(0.045)	(0.045)	(0.054)	(0.103)
Female* marriage			-0.2329***	-0.2333***	-0.2720***	-0.2595*
			(0.055)	(0.055)	(0.065)	(0.155)
Urban			0.1682***	0.1684***	0.1807***	0.0486
			(0.028)	(0.028)	(0.029)	(0.084)
Kaxeti[b]			-0.5427***	-0.5429***	-0.5237***	-0.7293***
			(0.049)	(0.049)	(0.051)	(0.183)
Qvemo Qartli			-0.0806**	-0.0806**	-0.0763*	-0.0920
			(0.040)	(0.040)	(0.043)	(0.116)
Samcxe			-0.7192***	-0.7198***	-0.7121***	-0.7753***
			(0.056)	(0.056)	(0.060)	(0.166)
Achara			-0.0961**	-0.0951**	-0.0922**	-0.1327
			(0.042)	(0.042)	(0.045)	(0.128)
Guria			-0.5808***	-0.5806***	-0.5795***	-0.5868***
			(0.055)	(0.055)	(0.058)	(0.202)
Samegrelo			-0.5635***	-0.5634***	-0.5430***	-0.7255***
			(0.046)	(0.046)	(0.048)	(0.159)
Imereti			-0.5016***	-0.5021***	-0.4922***	-0.5623***
			(0.040)	(0.040)	(0.043)	(0.114)
Shida Qartli			-0.3931***	-0.3929***	-0.3658***	-0.6181***
			(0.041)	(0.041)	(0.044)	(0.125)
D2001 [c]	0.0646	0.0651	0.0680*	0.0670*	0.0696*	0.0330

	(0.042)	(0.042)	(0.039)	(0.039)	(0.041)	(0.139)
D2001	0.1847***	0.1833***	0.1880***	0.1863***	0.1979***	0.0707
	(0.042)	(0.042)	(0.039)	(0.039)	(0.041)	(0.142)
D2003	0.1682***	0.1675***	0.1691***	0.1656***	0.1754***	0.0974
	(0.040)	(0.040)	(0.038)	(0.038)	(0.040)	(0.111)
D2004	0.3644***	0.3652***	0.3648***	0.3607***	0.3779***	0.2348**
	(0.039)	(0.039)	(0.037)	(0.037)	(0.039)	(0.118)
Constant	3.7311***	3.9427***	3.9757***	3.9368***	3.8821***	4.3481***
	(0.081)	(0.080)	(0.084)	(0.109)	(0.112)	(0.307)
Observations	5,763	5,763	5,757	5,757	5,143	614
R-squared	0.137	0.138	0.243	0.243	0.240	0.265

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; [a] omitted category is incomplete secondary education; [b] omitted category is Tbilisi; [c] omitted year is 2000.

number of years of post-Soviet education potentially controls for this source of bias (see Munich, Svejnar, and Terrell 2005). The resulting impact on the experience is not statistically significant ($F(1, 26693) = 0.29$, p-value = 0.5919) neither is the joint effect on all common coefficients ($F(18, 26676) = 0.02$, p-value = 1.0000). This appears to suggest that the improvements in the provision of skills more suitable to the market economy have been negated by the decline in the quality of education (table 4, column 5). This conclusion is further supported by the lack of a statistical difference between the returns to Soviet education and the returns to post-Soviet education ($F(1, 5756) = 0.29$, p-value = 0.5918).[23]

Another approach to addressing the possible bias in the experience coefficient arising from the differences in the quality of education is to consider older and younger cohorts separately. If the drop in the quality of education dominates, then the experience coefficient should increase when the younger cohort is considered separately. The opposite should occur for the older cohort. If the improvements in the composition of education dominate then the experience coefficient of younger individuals should be lower than the pooled estimate and for the older cohort, the opposite should hold.

This same approach addresses another source of bias in the experience coefficient stemming from the use of Age–Education–6 as a proxy for experience, as it may not accurately represent the working experience of individuals. This is so because many individuals in the sample may have been intermittently unemployed since the breakdown

[23] We arrive at similar conclusions by including a variable measuring the proportion of education acquired under the Soviet period.

of the Soviet Union. In fact, evidence from Georgia suggests that the probability of unemployment during 1990s varied depending on workers' age. In particular, younger individuals were more likely to become unemployed and had a harder time finding a job compared to older individuals (Bernabe and Stampini 2008). If so, the experience measure of younger individuals is likely to exaggerate their true experience, underestimating the experience coefficient in the regression including both young and old cohorts.

To evaluate both of these hypotheses, we break the sample into the cohort of younger and older workers. The younger cohort consists of workers born on or after 1975. These individuals entered the labor force after 1991 once they reached 16 years of age. The old cohort includes workers born before 1975. These workers have had some work experience during the Soviet period. The estimation shows that the returns to experience in the young cohort become negative (albeit insignificant) and in the old cohort they increase. These results lend support to the possibility that the improvements in the composition of education have overcome the deficiencies of the quality and go against the findings of Bernabe and Stampini (2008) that younger individuals were more likely to remain unemployed (table 4, columns 6 and 7). However, these estimates are insignificant, as is the difference between them and the experience estimate from the regression with both young and old cohorts. Also, our finding of negligible tenure effects is consistent with some of the work on transition countries (Cheidvasser and Benitez Silva 2007), presumably reflecting the unstable nature of the transition process, although it might also be an artifact of the measurement error.

In all specifications, there is a sizable premium to living in urban areas (although, as could be expected, it diminishes substantially once regional dummies are introduced). Moreover, there are significant gender differences. In particular, women earn less than men. Marriage is beneficial to men as their earnings increase by as much as 20% as a result of getting married. Women's earnings as a result of marriage are not statistically altered.[24] Note however that without information on the number of hours worked it is not possible to assess the welfare consequences of these results. It is conceivable, for example, that married men's earnings are higher than unmarried men's earnings because

[24] Joint effect (female + female*marriage) is not significantly different from zero in all specifications.

they work more hours in order to provide for their families. Similarly, married women might choose to work fewer hours, especially once they have children, but earn more per hour.

Despite the above attempts to control for the omitted variable bias, it is likely that the bias remains. Measurement error, for example, has been shown to be an important source of correlation between the matrix of regressors and the error term, especially in the household survey data (Griliches 1977). Its consequence is the attenuation bias: the tendency to *underestimate* the true coefficient. It is likely to apply to all the variables in the sample. In addition, in the case of the education variable, the ability bias and the discount bias can affect the coefficient estimates as well (both are examples of the omitted variable bias). The ability bias results in an *overestimated* coefficient, as ability and education are likely to be positively correlated. The discount bias, which has received much less attention in the literature, occurs when individuals differ in their marginal rates of substitution between present and future earnings. Those with a higher discount rate will choose less education, as future earnings are less valuable to them. Not taking explicit account of the differences in the discount rate will result in *underestimated* coefficients (Harmon, Oosterbeek, and Walker 2003; Card 1999). In the absence of variables to control for these sources of bias, we use instrumental variable estimation, treating education as the sole variable correlated with the error term to which the instrumental variable treatment is applied.

5.2 IV Estimation and Results

Instrumental variables in the education literature fall into two broad categories: background variables, such as parental or sibling education and occupation; and institutional variables, such as changes in the compulsory years of education, school proximity, and the cost of education (Card 2001). Even when valid, institutional variables are often irrelevant (Stock, Wright, and Yogo 2002). On the other hand, background variables, while relevant, are often invalid (Rischall 1999). Given the prevalence of nepotism and the importance of connections in determining economic success in Georgia (Kochladze and Gujaradze 2006), family background variables such as parents' education

or income level are likely to directly influence children's earnings. In such circumstances, institutional instrumental variables promise to be a better tool.

The two institutional instrumental variables constructed in this study are based on Soviet educational reforms, as the majority of the individuals in the sample received their formative education during the Soviet period. More specifically, 69.62%of the working-age sample was born before 1975 and thus received their higher education prior to the collapse of the Soviet Union in 1991 (22,073 out of 31,703 individuals in the sample). Further focusing on hired workers, 89.41% of the hired workers were born before 1975 (6,004 out of 6,715 individuals).

Table 5: First-stage and Second-stage IV Results

VARIABLES	IV First Stage	IV Second Stage
Education		0.0199**
		(0.009)
Experience	0.1096***	0.0037
	(0.011)	(0.004)
$Experience^2$	-0.0090***	-0.0001*
	(0.000)	(0.000)
Marriage	0.6492***	0.1503***
	(0.122)	(0.041)
Female	0.9387***	-0.4548***
	(0.130)	(0.044)
Female*Marriage	-0.5631***	-0.1962***
	(0.146)	(0.050)
Urban	0.2647***	0.1299***
	(0.071)	(0.026)
Kaxeti[a]	-0.7049***	-0.5529***
	(0.125)	(0.046)
Qvemo Qartli	-0.5263***	-0.1212***
	(0.118)	(0.040)
Samcxe	-0.6359***	-0.7192***
	(0.139)	(0.054)
Achara	-0.4791***	-0.1286***
	(0.109)	(0.041)
Guria	-0.2777*	-0.6009***
	(0.152)	(0.054)
Samegrelo	-0.4781***	-0.5679***
	(0.124)	(0.046)
Imereti	-0.4057***	-0.5121***
	(0.102)	(0.038)

Shida Qartli	-0.5820***	-0.3750***
	(0.105)	(0.039)
D2001[b]	0.2482***	0.0629*
	(0.093)	(0.035)
D2002	0.5955***	0.1838***
	(0.095)	(0.036)
D2003	0.9508***	0.1836***
	(0.092)	(0.034)
D2004	1.1341***	0.3673***
	(0.093)	(0.033)
Dfee	-2.8912***	
	(0.137)	
D5948	-3.8068***	
	(0.067)	
Constant	50.0926***	3.8970***
	(0.629)	(0.135)
Observations	5,757	5,757
Centered R-squared	0.3442	0.236
First-stage partial R-squared		0.2412
First-stage F(2,5736)		1863.58
		(0.000)
Hansen J statistic		2.477
(overidentification test of instruments)		(0.1155)
C-test		1.291
(endogeneity of schooling)		(0.25584)

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; [a]omitted category is Tbilisi; [b] omitted year is 2000.

The first instrumental variable is based on the reforms of 1958 and 1964 that affected the number of compulsory years of education. The instruments in Cheidvasser and Benitez Silva (2006) are based on these reforms as well; however, given the peculiarities of the Georgian case, our instruments differ from theirs. The second instrument is unique to this study. It is based on the elimination of the upper secondary and tertiary tuition fees in 1956 (for further details on the construction of instruments, see appendix A1).

The efficiency of the results and the validity of the standard tests for endogeneity of instrumental variables are based on the assumption of homoscedasticity. The White/Koenker test points to the presence of heteroscedasticity (see Baum, Schaffer, and Stillman 2002 and 2007). Therefore, we run a Generalized Method of Moments (GMM)

IV estimation of the model despite its poorer small-sample properties (Baum, Schaffer, and Stillman 2002 and 2007).

The relevance of the instruments is assessed with partial R^2 from the first stage regression, in which only the instruments are included ("partialled-out" R^2) (Bound, Jaeger, and Baker 1995). The R^2 of 0.2412 indicates that the instruments are relevant. The F-statistic for the joint significance of the instruments in the first-stage regression provides an additional piece of information. Staiger and Stock (1997) recommend that the F-statistic be at least 10. The value of the F-statistic—$F(2, 5736)$—in the estimation is 1863.58, corroborating the relevance of the instruments. The validity of the instruments is assessed using the J-statistic of Hansen (1982) for overidentifying restrictions. The hypothesis of excludability of instruments cannot be rejected at 10% significance level (the J-statistic is 2.477 with the p-value of 0.1155).

Once the relevance and validity of the instruments is established, the endogeneity of the education variable is assessed. We initially tested for the endogeneity of the education variable using the Durbin-Wu-Hausman test. However, as Baum, Schaffer, and Stillman (2002 and 2007) point out, this test in the context of the heteroscedasticity-robust GMM estimation often results in a negative statistic, which happened in our case. The use of the C-test avoids this problem. We cannot reject the hypothesis of exogeneity of the education variable at any reasonable significance level (the value of the chi-squared statistic is 1.291 and p-value of 0.25584).

These results suggest that the OLS coefficients are consistent and instrumenting for education is not necessary (Harmon, Oosterback, and Walker 2003). The IV coefficients are somewhat higher than the OLS coefficient, a result common in the literature.[25]

5.3 Sample Selection Estimation and Results

Next, we evaluate the presence of the sample selection bias. The literature commonly corrects for sample selection bias exclusively for women, the explanation being that the reservation wages are meant to reflect the opportunity cost of household production, presumably a woman's domain. However, the reservation wages into hired work also

[25] For corresponding results for each year, including the tests for relevance and validity, see table A2.

reflect the opportunity cost of self-employment. Moreover, the employment status of an individual reflects the decisions made not only by workers, but also by employers and these decisions influence both men and women. Therefore, it becomes necessary to test and correct for the sample selection bias for the whole sample, including men and women, which is what we do in this study.

The consistency of the sample selection corrected estimator depends on the identifiability of the system of equations in (3). Even though the system is identified under the assumption of the joint normality of the error terms in the two equations, to ensure identifiability we use the number of children under 16 and the interaction term between the number of children under 16 and the female dummy as additional variables in Z_i. The interaction term is intended to capture the gender differences in the impact of children on workers' employment status. While the number of children under sixteen is likely to influence the probability of individual's employment (for women, in particular), it is less likely that the variable measuring the number of children under six (another commonly used instrument) will influence their wages directly. Indeed, these identifying variables were both relevant (first-stage $F(2, 26692) = 13.42$, p-value = 0.0000) and valid (the adjusted Wald statistic testing the hypothesis that the instruments belong in the wage equation is $F(2, 26692) = 2.04$ with p-value of 0.1304). [26]

The evidence strongly indicates the presence of sample selection: the adjusted Wald statistic testing the equality of ρ to 0 is $F(1, 26693) = 6.69$, p-value = 0.0097. The sample selection corrected coefficient in the earnings equation, β, is 0.0522, that is an additional year of schooling raises potential wages (wage offers) by 5.22%. This increase compared to the OLS coefficient of 0.0111 is at least in part a reflection of the rising employment ratio with respect to educational attainment (see table 2). Less-educated individuals are disproportionately underrepresented in the sample, hence skewing the coefficient in the wage offer equation, in which observed and unobserved wage offers are present. Placing these numbers into the context of the literature, Cheidvasser and Benitez Silva (2007) report the sample selection corrected estimate of 0.0402 for Russia during 1992–1999. They, too, find an increase in the coefficient as a result of sample selection

[26] Number of children under six and number of elderly over sixty-five, commonly used in the literature as identifying variables, were found to be nonexcludable, as was marriage, another commonly used instrument, which in the paper is included in the earnings equation.

correction, however their increase is negligible. On the other hand, Clark (2003) observes a drop in the education coefficient estimate as a result for the sample selection correction. Arabsheibani and Mussurov (2007) also report a drop in the sample selection corrected IV coefficient for married women down to 0.137.

As it was previously pointed out, the appropriate measure to which to compare the OLS coefficients is the conditional marginal effect of education on earnings, β_1, which in our case equals 0.0069 and is statistically insignificant. Note that it is relatively close to the OLS estimate β_{ols} of 0.0011, even though we find a strong presence of sample selection. The estimate of β_1 reinforces the OLS finding of the very low benefit from education for the currently employed workers. At the same time, the observation that the estimate of β_1 is lower than the sample selection corrected estimate of the education coefficient, β, indicates that a random individual drawn from the population would gain proportionately more from an additional year of education than a typical currently employed individual would (Arrazola and de Hevia 2008).

Table 6: Returns to Education in the Extended Specification

	OLS	IV	β	β_1	β_2
pooled	0.0111***	0.0199**	0.0522***	0.0069	0.1592***
	(0.004)	(0.009)	(0.017)	(0.005)	(0.005)
2000	0.0035	0.0112	-0.0987***	0.0150	0.1656***
	(0.011)	(0.021)	(0.017)	(0.011)	(0.011)
2001	0.0062	0.0441**	0.0679***	-0.0005	0.1298***
	(0.010)	(0.018)	(0.017)	(0.010)	(0.011)
2002	0.0168	0.0047	-0.0011	0.0187*	0.1565***
	(0.010)	(0.020)	(0.017)	(0.010)	(0.012)
2003	0.0061	0.0236	0.0446**	0.0021	0.1763***
	(0.009)	(0.019)	(0.019)	(0.010)	(0.010)
2004	0.0280***	0.0218	-0.0411**	0.0355***	0.1774***
	(0.009)	(0.018)	(0.017)	(0.009)	(0.010)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; β is sample selection corrected education coefficient, β_1 is conditional marginal effect and β_2 is the unconditional marginal effect.

Our key conclusion so far is that education has very little influence on the earnings of workers in Georgia (conditional on their working status). However, looking at the estimate of the unconditional marginal effect of education on earnings, β_2, we observe

the role that education does play in Georgia: higher educational attainment increases the proportion of working-age individuals who are employed, hence raising the proportion of people earning any positive wage. More specifically, the unconditional marginal effect of education in Georgia is 0.1592, that is one additional year of education raises the mean earnings of employed individuals by 15.92%. This increase comes almost entirely due to the impact of education on the proportion of employed individuals.

In the absence of comparison for other transition countries, we place these results in the context of two studies analyzing the cases of Brazil and Spain. Hoffmann and Kassouf (2005) evaluate a sample of Brazilian women using the data from 1999. Their findings indicate that the sample selection corrected education coefficient (β) is higher at 0.1165 than the OLS estimate of 0.1106 (β_{ols}) and higher than the conditional marginal effect of 0.1095 (β_1). Their unconditional marginal effect of 0.1606 (β_2) is the highest of the three. In the Spanish case, using the data from 2000, Arrazola and de Hevia (2008) find that the sample selection corrected estimate of 0.081 (β) is higher than conditional marginal effect of education of 0.074 (β_1).[27] The unconditional effect (β_2) is again the highest than 0.166. Compared to both Brazil and Spain, education appears to have very little direct impact on the earnings of working individuals in Georgia. However, the large impact of education on the probability of becoming a hired worker compensates for the low returns to education conditional on being employed, so much so that the unconditional marginal effect of education on earnings in all three cases is around 0.16.

A similar situation applies to experience. Its primary impact on earnings is via the increase in the probability of employment. One additional year of education raises the unconditional mean of earnings by 7.77%. Once employed, the impact of experience is negligible. The insignificance of experience has been demonstrated in other studies as well (Cheidvasser and Benitez Silva 2007).

[27] Arrazola and de Hevia (2008) do not report OLS results.

Table 7: Returns to Experience in the Extended Specification

	OLS	IV	β	β_1	β_2
pooled	0.0036***	0.0037	0.0242**	0.0020	0.0777***
	(0.000)	(0.004)	(0.009)	(0.004)	(0.004)
2000	-0.0010**	0.0006	-0.0534***	0.0033	0.0817***
	(0.000)	(0.009)	(0.012)	(0.010)	(0.008)
2001	0.0046***	0.0003	0.0487***	0.0019	0.0893***
	(0.000)	(0.009)	(0.014)	(0.010)	(0.008)
2002	-0.0037***	0.0008	-0.0145	-0.0028	0.0899***
	(0.000)	(0.011)	(0.015)	(0.012)	(0.009)
2003	0.0016***	-0.0004	0.0148	0.0004	0.0596***
	(0.000)	(0.008)	(0.010)	(0.008)	(0.008)
2004	0.0125***	0.0139*	-0.0158	0.0138	0.0684***
	(0.000)	(0.008)	(0.012)	(0.009)	(0.008)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; β is sample selection corrected education coefficient, β_1 is conditional marginal effect and β_2 is the unconditional marginal effect.

6. ANALYSIS OF THE RESULTS

The low estimates of returns to education in Georgia are puzzling, especially in the background of an expanding economy. Equally puzzling appears to be the lack of an increasing trend during 2000–2004, as can be seen from table 6. The OLS results, the IV results, the sample selection corrected education coefficient, and conditional marginal effects hardly present a story of rising rates of return.[28] The only evidence of dynamism emerges in the increased impact of education on earnings after taking into account the probability of becoming a hired worker (unconditional marginal effect β_2). Note that the probability itself has not increased, however rising real wages contributed to the increase (see table A4).

To investigate the causes of the stagnant situation, we explore the shifts that have taken place in the supply and demand for education.

[28] Similar to pooled results, OLS results for each year tend to be lower than IV results, as well as sample selection corrected results. See the appendix for full OLS, IV, and sample selection corrected results.

6.1 Supply

To better understand the supply-side forces, we reestimate using the sample selection estimation the extended model with the years of Soviet and post-Soviet education. Similar to the OLS specification, sample selection corrected coefficients are not statistically different from each other (table 8).[29] Neither are the conditional marginal effects of education. However, differences emerge between unconditional marginal effects. Soviet education appears to have a greater impact on the earnings by raising the probability of being employed much more so than post-Soviet education does (see first-stage results in table A5).[30] In fact, if anything, the overall impact of Soviet education during 2000–2004 appears to have increased, while the same cannot be said about post-Soviet education. This implies that while the proportion of the population with Soviet education is diminishing, the new generation of the workforce has not yet successfully substituted for it, explaining the absence of an increase in the returns to education.

Using another angle to understand the supply-side changes, we reestimate the sample selection corrected model with levels of education instead of the years of education (table 9).[31] After the correction for sample selection bias, the conditional marginal effects of completed secondary and technical education turn insignificant. The conditional marginal effect of university education drops to only 0.1006, but remains marginally significant at 10%. Hence, we observe low returns to education at every level of educational attainment. The key finding however yet again lies in the differences observed in the unconditional marginal effect. University education pays off substantially as the earnings of workers rise by 131.75% (relative to incomplete secondary education) as a result of obtaining university education once the change in the proportion of individuals hired is taken into account. This number is compared to 14.26% for completed secondary education and 63.15% for completed technical education. Most of these gains appear to have taken place in 2003 and 2004, potentially pointing to shifts in the impact of education.

[29] $F(1, 26693) = 0.09$, p-value=0.7659.
[30] The difference between the Soviet education and post-Soviet education coefficient estimates in the first-stage Probit is significant at 1% for pooled estimation and for each year.
[31] The full set of results is available upon request.

6.2 Demand

Looking at the developments on the demand side, the Georgian GDP in constant 1990 dollars expanded at an average rate of 6% during 2000–2004. Therefore, it might seem puzzling that the returns to education have not increased. However, a more careful look at the situation reveals possible reasons.

Two distinct groups of industries can be identified in explaining the expansion of the Georgian GDP during 2000–2004. The first group includes heavily or completely state-financed industries, which are public administration, healthcare, social services, and education, with wages largely set by the government. Together they employed 45.47% of hired workforce. The second group includes trade (employing 10.26% of hired workforce) and financial intermediation, communications, real estate, transport storage and communications, and construction (with joint 16.79% of the hired workforce). The proportion of workers with a university degree in the first group of industries is among the highest of all the industries in Georgia. Yet, the degree of remuneration in these industries is ahead of only agriculture (table 2). The second group, on the other hand, employs a well-educated workforce and pays above average wages. However, its proportion of employment is relatively low. Therefore, it appears that the Georgian economy during 2000–2004 was largely expanding in the direction of largely state-financed industries employing a highly educated workforce, but paying relatively low wages.

Table 8: Returns to *Soviet and post-Soviet Education* in the Extended Model

	Soviet Education				Post-Soviet Education			
	OLS	β	β_1	β_2	OLS	β	β_1	β_2
pooled	0.0109**	0.0484**	0.0072	0.1590***	0.0166	0.0448**	0.0146	0.1182***
	(0.004)	(0.020)	(0.005)	(0.005)	(0.011)	(0.018)	(0.011)	(0.011)
2000	0.0015	-0.1001***	0.0133	0.1654***	0.0466*	-0.0370	0.0488*	0.1329***
	(0.011)	(0.017)	(0.011)	(0.011)	(0.028)	(0.034)	(0.028)	(0.025)
2001	0.0060	0.0664***	-0.0003	0.1298***	0.0105	0.0413	0.0082	0.0661**
	(0.010)	(0.018)	(0.010)	(0.011)	(0.031)	(0.032)	(0.030)	(0.028)
2002	0.0167	0.0015	0.0183*	0.1555***	0.0209	0.0125	0.0213	0.0830***
	(0.010)	(0.016)	(0.010)	(0.012)	(0.030)	(0.031)	(0.030)	(0.029)
2003	0.0056	0.0442**	0.0016	0.1770***	0.0163	0.0399	0.0151	0.1057***
	(0.010)	(0.019)	(0.010)	(0.010)	(0.022)	(0.025)	(0.022)	(0.024)
2004	0.0280***	-0.0402**	0.0353***	0.1774***	0.0284	-0.0107	0.0303	0.0984***
	(0.009)	(0.018)	(0.009)	(0.010)	(0.025)	(0.027)	(0.024)	(0.024)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; β is sample selection corrected education coefficient, β_1 is conditional marginal effect and β_2 is the unconditional marginal effect.

Table 9: Sample Selection Corrected Returns to Levels of Education in the Extended Model

	Completed secondary				Technical				University			
	OLS	β	β_1	β_2	*OLS*	β	β_1	β_2	*OLS*	β	β_1	β_2
pooled	0.1548**	0.1050	0.0699	0.1426***	0.0877	0.1886**	0.0325	0.6315***	0.2753***	0.4020***	0.1006*	1.3175***
	(0.069)	(0.066)	(0.062)	(0.049)	(0.068)	(0.094)	(0.062)	(0.062)	(0.067)	(0.144)	(0.061)	(0.067)
2000	0.0712	0.0606	0.0611	0.0119	-0.0027	-0.3421**	-0.0194	0.4800***	0.0466	-0.6242***	0.0647	1.1655***
	(0.139)	(0.163)	(0.140)	(0.098)	(0.138)	(0.168)	(0.141)	(0.119)	(0.138)	(0.181)	(0.141)	(0.132)
2001	-0.1083	-0.0894	-0.0857	-0.0239	-0.1656	0.0799	-0.1330	0.4139***	-0.0757	0.3627**	-0.0702	0.9558***
	(0.133)	(0.145)	(0.135)	(0.103)	(0.131)	(0.151)	(0.132)	(0.123)	(0.128)	(0.172)	(0.130)	(0.135)
2002	0.1597	-0.0239	0.1403	0.1591	0.2279	0.1760	0.2266	0.7276***	0.2581*	0.9558***	0.1669	0.2591*
	(0.147)	(0.103)	(0.147)	(0.146)	(0.145)	(0.153)	(0.144)	(0.174)	(0.145)	(0.135)	(0.172)	(0.144)
2003	0.2600*	0.3237**	0.2658*	0.2652**	0.1633	0.3438**	0.1746	0.7736***	0.2253*	0.5581***	0.2256*	1.6123***
	(0.139)	(0.144)	(0.139)	(0.108)	(0.141)	(0.156)	(0.141)	(0.145)	(0.136)	(0.185)	(0.137)	(0.149)
2004	0.1136	-0.0404	0.1003	0.3333***	0.0722	-0.3009**	0.0468	0.9298***	0.2292*	-0.3539**	0.2168*	1.6860***
	(0.121)	(0.134)	(0.121)	(0.108)	(0.120)	(0.149)	(0.120)	(0.140)	(0.118)	(0.175)	(0.119)	(0.146)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; β is sample selection corrected education coefficient, β_1 is conditional marginal effect and β_2 is the unconditional marginal effect.

To further explore this hypothesis, we include industrial dummies in the sample selection corrected model.[32] If the hypothesis above is correct, controlling for industries, the education coefficient should increase compared to the sample selection corrected model without industrial dummies (table 7). As can be seen from table 10, this is in fact what we observe.[33] Note however that although the estimates of the returns to education rise, they still remain below the estimates from other countries.[34]

Table 10: Returns to Education in the Extended Model with Industrial Dummies

	OLS	β	β_1	β_2
pooled	0.0431***	0.0844***	.0389***	.1543***
	(0.005)	(0.012)	(.0047)	(.0050)
2000	0.0358***	-0.0564***	0.0431***	0.1455***
	(0.011)	-0.017	-0.011	-0.011
2001	0.0246**	0.0815***	0.0186*	0.1218***
	(0.010)	-0.016	-0.01	-0.012
2002	0.0592***	0.0304	0.0621***	0.1569***
	(0.011)	-0.066	-0.013	-0.012
2003	0.0409***	0.0769***	0.0371***	0.1809***
	(0.009)	-0.015	-0.009	-0.011
2004	0.0662***	0.0009	0.0720***	0.1726***
	(0.010)	-0.017	-0.01	-0.011

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; β is sample selection corrected education coefficient, β_1 is conditional marginal effect, and β_2 is the unconditional marginal effect.

One important caveat that applies to the analysis of our results has to do with income underreporting in certain industries. In particular, Yemtsov (2001) reports that health and public administration were particularly susceptible to underreporting in Georgia in the mid-1990s. If such a situation persisted during 2000–2004, this would provide an additional explanation for the low estimates of the returns to education.

[32] In interpreting the results of the model with industrial dummies, we have to be mindful of the potential endogeneity of the introduced dummies, as wages can be important determinants of the choice of the industry. For a discussion on the inclusion of industrial and occupational dummies, see Munich, Svejnar, and Terrell (2005) and Campos and Jolliffe (2003).

[33] The results are robust to the specification with hired households and international sectors dropped from the estimation. The full set of the results reported in table 10 are available upon request.

[34] Note however that the estimates from the model with industrial dummies are not fully comparable to the estimates from other studies reported in section 5.1. The reported estimates from other studies were obtained using basic or extended specifications without industrial dummy variables.

7. CONCLUSIONS

The economic returns to education have been extensively evaluated in the literature. More recent literature has focused on the case of transition countries. The present study estimates the returns to education in Georgia during 2000–2004. We find very low returns to education in Georgia and there is little evidence of an increasing trend in the returns. This picture contrasts with somewhat higher rates of return to education in the mid-1990s in Georgia and the recent estimates from other transition countries.

The analysis of the factors responsible for the low returns reveals that post-Soviet education yields a lower impact compared to the education acquired during Soviet times, indicating that the post-Soviet educational system has not yet provided a competitive alternative to Soviet education. The changes that took place in the output composition are also responsible for the relatively low returns to education. During 2000–2004 the Georgian economy expanded in the direction of industries, such as public administration and education that employ a skilled workforce, but remunerate relatively poorly.

Despite the seemingly pessimistic picture, education is found to be of value in Georgia. Currently its key role in Georgia lies in providing higher chances of finding a job rather than in raising the wages of workers who already hold jobs. In particular, having a university degree is found to have the highest impact on the probability of finding a job. Similarly, the impact of experience on wages is manifested largely in workers having a higher probability of finding jobs. These results could be due to the relatively slow process of job creation in Georgia.

Since 2005, reforms have taken place in the education sector and in the business sector that may change the described trends. In particular, investments into the physical infrastructure of schools have increased and efforts have been made to rid the educational system of corruption and to generally transform it (Pachuashvili 2007). The new comprehensive university entrance test was introduced in 2005, which effectively eliminated corruption at the entry-level into the higher education. These changes will likely lead to improvements in the quality of education in Georgia. Moreover, the changes in the business environment, including the new labor code passed in 2006 and the simplification of the procedures for setting up businesses introduced in 2005, should

contribute to the expansion of the private sector. To the extent that the improvements in the quality of education result in the increased productivity of the workforce and the expansion of the private sector results in increased demand for a skilled workforce, we can expect an increase in the returns to education. However it remains to be seen whether this will in fact happen.

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APPENDIX

A1. Soviet Educational Reforms and Instrumental Variables

The specific elements of the Soviet educational reforms relevant to this study are the changes in: 1) the number of compulsory years of schooling, and 2) the cost of education.

The set of reforms that introduced **compulsory education** into the Soviet educational system originated in 1931 when Soviet planners introduced the four-year compulsory education. This development was followed by a move to the seven-year compulsory education in 1949, after World War II (Kaser 1986). The 1958 Law on Education passed during Nikita Khruschev's leadership further increased the number of compulsory schooling years to eight. The main objective of the 1958 Law on Education was to bridge the perceived rift between theoretical knowledge acquired in classroom and the practical needs of the economy. Khruschev's position was that the acquisition of practical skills was to have priority over the development of academic knowledge. To achieve this objective, the number of secondary schooling years was increased from ten to eleven years, with the eleventh year providing opportunities for developing practical skills (Schlesinger 1959). However, this reform proved to be unpopular and was followed by the 1964 Law on Education, which retracted many of the changes introduced in 1958, in particular that of the increase in the number of schooling years from ten to eleven.

Despite the standardized nature of the Soviet educational system, in some cases, there was substantial regional variation in the implementation of reforms (Bilinsky 1962, 1964, and 1968). For example, following the reform of 1964, in Georgia (and the Baltic States), the commitment to the teaching of the native language resulted in the introduction of the additional year to the bottom of the grid (Schlesinger 1959: 434; Bilinsky 1962: 145). Thus, instead of seven years of age, children in these republics entered school at the age of six. Consequently, the number of schooling years remained at eleven after 1964 (except that now the additional year was added to the bottom of the grid instead of the top) (Bilinsky 1958: 424; Vardys 1967: 61). Moreover, as a result of adding a year to the bottom of the grid, the number of compulsory years of education became nine instead of eight.

The second set of reforms relevant to this paper deals with the private **costs of education**. The Soviet system of education oscillated between the need to produce highly skilled workers and the necessity of producing a labor force willing and able to work at factories. In an attempt to control the numbers of individuals pursuing upper secondary and tertiary education, in 1940, tuition fees were introduced for secondary education beyond the at-the-time compulsory seven years of secondary schooling and for tertiary education. World War II changed Soviet population dynamics, leading to a shortage of applicants desiring to pursue upper secondary and tertiary education. As a result, in 1956 all fees were abolished (Kaser 1986; Bereday, Brickman, and Read 1960: 190).

Instrumental variable D4859

The practical implementation of the switch to eight years of compulsory education as a result of the 1958 reform took several years and the first class that completed eight compulsory years was the class of 1963 (Romanova 2003). These were individuals who were 14 years old as of September 1, 1962 (the beginning of the school year), thus individuals born before September 1, 1948. The information about the birth month of the respondents is not available and consequently, in constructing the instrumental variable, it is assumed that all individuals born in 1948 were in the eighth grade as of September 1, 1962. Moreover, as pointed out, unlike most other Soviet republics where the number of compulsory schooling years remained at eight years after the 1964 educational reform, in Georgia, a further increase of the number of compulsory years to nine years occurred due to the reduction in the age of students at the entry from seven to six years old as of September of 1965. Thus children born in 1959 and after received nine compulsory years of education.

In constructing this instrumental variable, we assign the value of seven to individuals born before 1948. To individuals born between 1948 and 1958 (including 1958), the assigned value is eight. Finally, individuals born in 1959 and after are assigned the value of nine. As a result, 10.89% of the working-age sample falls into the first category, 22.57% falls into the second category, and 66.53% falls into the third.

When focusing on the restricted sample (excluding self-employed, unemployed, and zero-earning employed), 12.78% fall into the first category, 31.94% into the second, and 55.27% into the third.

This variable can be expected to correlate with the years of schooling since that variable was constructed by using the same information about the reforms. However, the degree of correlation is not likely to present any problems, as the Pearson correlation coefficient between D5948 and the education variable is only 0.0413.

Instrumental variable D42

The transition to eleven years of secondary education as a result of the 1958 reform also took several years. The first affected class were individuals who were entering tenth grade in September of 1958 (they were sixteen in 1958 and were born in 1942). Therefore, these individuals would graduate at the end of the 1959–1960 academic year. However, it was only by 1963 that all schools adopted the eleven-year course load (Romanova 2003). As pointed out above, unlike in most Soviet republics, in Georgia, the reform of 1964 did not result in the move back to the ten-year system, as the additional year was added to the bottom of the educational grid. Therefore, the Georgian school maintained an eleven-year system.

In 2004, the Georgian Ministry of Education and Science implemented a reform raising the number of years to twelve. However, these reforms were retracted before any class could graduate. Even if fully implemented, these reforms would not have affected our sample.

In summary, the value of the dummy D42 is 0 for individuals born before 1942 and is 1 for those born in and after 1942. As a result, in the restricted sample, 4.59% fall into the 0 category and 95.41% into the 1 category.

Instrumental variable Dfee

Individuals affected by the elimination of the fees in 1956 were those who were in seventh grade at the beginning of the school year on September 1. These were individuals who were thirteen at the time, thus born in 1943 and after.

Another major wave of changes in the private cost of tuition occurred in 1991 with the establishment of fee-based private higher education institutions and in 1993 with the introduction of fees at state higher education institutions in 1993. However, unlike the 1956 change, these changes cannot be included as an instrumental variable or its component. This is so because we cannot claim that the 1991 changes affected wages exclusively through the education variable. Although tuition fees are one aspect of the changes that occurred since 1991, institutional and economic changes that ensued were perhaps even more important and arguably had an even bigger impact on wages.

In summary, the fee-based dummy variable, Dfee, takes the value of 0 for individuals born before 1943 and 1 for individuals born in 1943 and after; this results in 5.56% individuals falling into the 0 category and 94.44% into the 1 category. Given the similarity between this variable and D42, we choose the fee-based variable. Intuitively this is a stronger variable, although, once constructed, it is virtually identical to the D42 variable.

Table A1: OLS Time Trends

VARIABLES	2000	2001	2002	2003	2004
	(1)	(2)	(3)	(4)	(5)
Education	0.0035	0.0062	0.0168	0.0061	0.0280***
	(0.011)	(0.010)	(0.010)	(0.009)	(0.009)
Experience	-0.0010	0.0046	-0.0037	0.0016	0.0125
	(0.010)	(0.011)	(0.012)	(0.008)	(0.010)
Experience2	-0.0001	-0.0003	-0.0000	-0.0001	-0.0003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.4776***	-0.3060***	-0.2528**	-0.5365***	-0.4876***
	(0.104)	(0.110)	(0.127)	(0.088)	(0.101)
Marriage	0.1483	0.2553***	0.4716***	0.1344	0.0452
	(0.094)	(0.098)	(0.129)	(0.084)	(0.090)
Female*Marriage	-0.0564	-0.4447***	-0.4714***	-0.0948	-0.1827
	(0.124)	(0.124)	(0.140)	(0.107)	(0.113)
Urban	0.1656**	0.2873***	0.1670**	0.1132*	0.0493
	(0.068)	(0.057)	(0.065)	(0.062)	(0.057)
Kaxeti[$]	-0.4434***	-0.5308***	-0.7089***	-0.5215***	-0.5779***
	(0.121)	(0.113)	(0.116)	(0.106)	(0.092)
Qvemo Qartli	-0.0864	0.0766	-0.1036	0.0135	-0.2908***
	(0.096)	(0.082)	(0.098)	(0.092)	(0.078)
Samcxe	-1.1610***	-0.9117***	-0.6707***	-0.4554***	-0.4815***
	(0.134)	(0.115)	(0.124)	(0.115)	(0.103)
Ajara	0.1063	-0.0506	-0.0910	-0.1507	-0.3067***
	(0.091)	(0.091)	(0.104)	(0.099)	(0.085)
Guria	-0.6273***	-0.4398***	-0.5710***	-0.5297***	-0.8210***
	(0.118)	(0.133)	(0.108)	(0.143)	(0.125)
Samegrelo	-0.4676***	-0.3594***	-0.4596***	-0.7647***	-0.7798***
	(0.108)	(0.094)	(0.109)	(0.101)	(0.097)
Imereti	-0.5420***	-0.5862***	-0.4874***	-0.4251***	-0.4434***
	(0.096)	(0.089)	(0.089)	(0.082)	(0.080)
Shida Qartli	-0.3971***	-0.2406***	-0.4520***	-0.4047***	-0.5382***
	(0.103)	(0.086)	(0.087)	(0.091)	(0.096)
Constant	4.1243***	3.9865***	3.9588***	4.3057***	4.2586***
	(0.206)	(0.180)	(0.197)	(0.162)	(0.169)
Observations	1,105	1,152	964	1,236	1,300
R-squared	0.215	0.275	0.263	0.221	0.250

Notes: Standard errors in parentheses ; *** p<0.01, ** p<0.05, * p<0.1;[$]omitted category is Tbilisi;

Table A2: IV Time Trends (second stage results)

VARIABLES	pooled	2000	2001	2002	2003	2004
	(1)	(2)	(3)	(4)	(5)	(6)
Education	0.0199**	0.0112	0.0441**	0.0047	0.0236	0.0218
	(0.009)	(0.021)	(0.018)	(0.020)	(0.019)	(0.018)
Experience	0.0037	0.0006	0.0003	0.0008	-0.0004	0.0139*
	(0.004)	(0.009)	(0.009)	(0.011)	(0.008)	(0.008)
Experience2	-0.0001*	-0.0001	-0.0001	-0.0001	-0.0000	-0.0003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.4548***	-0.5421***	-0.3367***	-0.3290***	-0.4906***	-0.4726***
	(0.044)	(0.099)	(0.099)	(0.118)	(0.087)	(0.092)
Marriage	0.1503***	0.0612	0.2392***	0.3602***	0.1092	0.0786
	(0.041)	(0.090)	(0.087)	(0.119)	(0.080)	(0.084)
Female*Marriage	-0.1962***	0.0034	-0.4394***	-0.3776***	-0.1392	-0.1346
	(0.050)	(0.114)	(0.111)	(0.130)	(0.101)	(0.101)
Urban	0.1299***	0.1444**	0.2864***	0.1665***	0.0313	-0.0145
	(0.026)	(0.060)	(0.054)	(0.061)	(0.061)	(0.053)
Kaxeti	-0.5529***	-0.4228***	-0.4822***	-0.6851***	-0.6196***	-0.6548***
	(0.046)	(0.115)	(0.110)	(0.109)	(0.104)	(0.087)
Qvemo Qartli	-0.1212***	-0.0830	0.1289	-0.1410	-0.1692*	-0.3518***
	(0.040)	(0.094)	(0.084)	(0.099)	(0.096)	(0.078)
Samcxe	-0.7192***	-1.0400***	-0.8380***	-0.7276***	-0.5116***	-0.5007***
	(0.054)	(0.129)	(0.111)	(0.114)	(0.112)	(0.101)
Achara	-0.1286***	0.0592	-0.0410	-0.1118	-0.1675*	-0.4100***
	(0.041)	(0.093)	(0.087)	(0.104)	(0.089)	(0.082)
Guria	-0.6009***	-0.5988***	-0.4100***	-0.6027***	-0.5905***	-0.8685***
	(0.054)	(0.117)	(0.130)	(0.107)	(0.139)	(0.120)
Samegrelo	-0.5679***	-0.4363***	-0.3164***	-0.4748***	-0.8250***	-0.8706***
	(0.046)	(0.105)	(0.093)	(0.106)	(0.098)	(0.099)
Imereti	-0.5121***	-0.5061***	-0.5121***	-0.5042***	-0.5015***	-0.5468***
	(0.038)	(0.094)	(0.090)	(0.092)	(0.078)	(0.075)
Shida Qartli	-0.3750***	-0.4072***	-0.1798**	-0.4653***	-0.4074***	-0.5088***
	(0.039)	(0.103)	(0.091)	(0.089)	(0.082)	(0.079)
D2001	0.0629*					
	(0.035)					
D2002	0.1838***					
	(0.036)					
D2003	0.1836***					
	(0.034)					
D2004	0.3673***					
	(0.033)					
Constant	3.8970***	4.0436***	3.4645***	4.1650***	4.1675***	4.3572***
	(0.135)	(0.329)	(0.279)	(0.326)	(0.277)	(0.274)
Observations	5,757	1,105	1,152	964	1,236	1,300
R-squared	0.236	0.217	0.267	0.259	0.209	0.233
First-stage	0.2412	0.2646	0.3002	0.2780	0.2476	0.1914

partial R-squared						
First-stage F-statistic (p-values)	1863.58 (0.000)	363.84 (0.000)	553.75 (0.000)	465.78 (0.000)	480.21 (0.000)	348.79 (0.0000)
Hansen J statistic (overidentification test of instruments)(p-values)	2.477 (0.1155)	4.945 (0.02617)	0.017 (0.89485)	0.071 (0.78942)	0.690 (0.40612)	0.667 (0.41405)
C-test (endogeneity of schooling) (p-values)	1.291 (0.25584)	0.066 (0.79757)	7.531 (0.00607)	0.248 (0.61880)	1.481 (0.22369)	0.260 (0.61009)

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Additional notes:

Pooled: relevance, validity and exogeneity all pass

2000: relevance passed, validity does not pass, exogeneity does (but since validity doesn't unclear how reliable the result is)

2001: relevance passes, validity passes; exogeneity does not pass (the results need to be corrected)

2002: relevance passes, validity passes, exogeneity passes

2003: relevance passes, validity passes, exogeneity passes

2004: relevance passes, validity passes, exogeneity passes.

Table A3: Sample Selection Corrected Results (pooled regression)

	Extended			Extended with Soviet and post-Soviet education			Extended with Levels of Education		
VARIABLES	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Eqn: lnw1m									
Education	0.0522***	0.0069	0.1592***						
	(0.017)	(0.005)	(0.005)						
Post-Soviet ed				0.0448**	0.0146	0.1182***			
				(0.018)	(0.011)	(0.011)			
Soviet educ				0.0484**	0.0072	0.1590***			
				(0.020)	(0.005)	(0.005)			
Secondary							0.1050	0.0699	0.1426***
							(0.066)	(0.062)	(0.049)
Technical							0.1886**	0.0325	0.6315***
							(0.094)	(0.062)	(0.062)
University							0.4020***	0.1006*	1.3175***
							(0.144)	(0.061)	(0.067)
Female	-0.3966***	-0.4458***	0.0834**	-0.3976***	-0.4467***	0.0996**	-0.4020***	-0.4405***	0.0499
	(0.051)	(0.048)	(0.042)	(0.052)	(0.049)	(0.042)	(0.051)	(0.049)	(0.041)
Experience	0.0242**	0.0020	0.0777***	0.0199**	0.0065	0.0523***	0.0233**	0.0026	0.0723***
	(0.009)	(0.004)	(0.004)	(0.010)	(0.007)	(0.007)	(0.010)	(0.005)	(0.004)
Experience2	-0.0005***	-0.0002*	-0.0013***	-0.0004**	-0.0002*	-0.0009***	-0.0005***	-0.0002*	-0.0013***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Marriage	0.2260***	0.1943***	0.1452***	0.2227***	0.1937***	0.1452***	0.2190***	0.1948***	0.1178***
	(0.048)	(0.045)	(0.040)	(0.049)	(0.045)	(0.040)	(0.048)	(0.045)	(0.040)
Female*Marriage	-0.3600***	-0.2364***	-0.4389***	-0.3500***	-0.2368***	-0.4403***	-0.3499***	-0.2364***	-0.4026***
	(0.076)	(0.055)	(0.045)	(0.084)	(0.055)	(0.045)	(0.077)	(0.055)	(0.044)
Urban	0.2745***	0.1592***	0.4291***	0.2654***	0.1603***	0.4288***	0.2631***	0.1605***	0.3872***
	(0.050)	(0.028)	(0.026)	(0.057)	(0.028)	(0.026)	(0.049)	(0.028)	(0.025)
Regions	yes	yes	yes	yes	yes	yes	yes	yes	yes
D2001	0.0579	0.0699*	-0.0277	0.0602	0.0680*	-0.0168	0.0575	0.0691*	-0.0004

	(0.040)	(0.039)	(0.036)	(0.040)	(0.039)	(0.036)	(0.040)	(0.039)	(0.036)
D2002	0.1672***	0.1914***	-0.0469	0.1712***	0.1885***	-0.0297	0.1730***	0.1872***	0.0242
	(0.040)	(0.039)	(0.036)	(0.040)	(0.039)	(0.036)	(0.040)	(0.039)	(0.037)
D2003	0.1513***	0.1720***	-0.0387	0.1562***	0.1665***	-0.0072	0.1552***	0.1693***	0.0220
	(0.039)	(0.038)	(0.035)	(0.039)	(0.038)	(0.036)	(0.039)	(0.038)	(0.035)
D2004	0.3426***	0.3676***	-0.0174	0.3492***	0.3608***	0.0244	0.3475***	0.3651***	0.0490
	(0.038)	(0.037)	(0.035)	(0.038)	(0.037)	(0.037)	(0.038)	(0.036)	(0.035)
NC16[a]		-0.0079	0.0260*		-0.0056	0.0203		-0.0063	0.0214
		(0.006)	(0.015)		(0.005)	(0.016)		(0.006)	(0.015)
Female*NC16		0.0322**	-0.1059***		0.0316**	-0.1143***		0.0295**	-0.1006***
		(0.013)	(0.023)		(0.016)	(0.024)		(0.014)	(0.023)
Constant	2.6899***			2.8367***			3.1688***		
	(0.513)			(0.582)			(0.386)		
Eqn: select									
NC16	0.0257*			0.0200			0.0243		
	(0.015)			(0.015)			(0.015)		
Female*NC16	-0.1049***			-0.1127***			-0.1071***		
	(0.022)			(0.022)			(0.022)		
gender	0.1600***			0.1754***			0.1330***		
	(0.038)			(0.039)			(0.039)		
Education	0.1474***								
	(0.005)								
Soviet Ed				0.1475***					
				(0.005)					
Post-Soviet Ed				0.1080***					
				(0.010)					
Secondary							0.1183***		
							(0.045)		
Technical							0.5403***		
							(0.047)		
University							1.0767***		
							(0.047)		

Experience	0.0722***			0.0478***			0.0706***		
	(0.003)			(0.006)			(0.003)		
Experience2	-0.0012***			-0.0008***			-0.0012***		
	(0.000)			(0.000)			(0.000)		
Marriage	0.1028***			0.1032***			0.0798**		
	(0.039)			(0.039)			(0.040)		
Female *Marriage	-0.3976***			-0.4002***			-0.3791***		
	(0.048)			(0.048)			(0.049)		
Urban	0.3748***			0.3752***			0.3493***		
	(0.024)			(0.024)			(0.024)		
Regions	yes			yes			yes		
D2001	-0.0387			-0.0281			-0.0427		
	(0.034)			(0.034)			(0.034)		
D2002	-0.0782**			-0.0615*			-0.0525		
	(0.034)			(0.034)			(0.034)		
D2003	-0.0672**			-0.0366			-0.0523		
	(0.032)			(0.033)			(0.032)		
D2004	-0.0811***			-0.0415			-0.0640**		
	(0.031)			(0.033)			(0.032)		
Constant	-3.4505***			-3.1457***			-2.0723***		
	(0.075)			(0.102)			(0.063)		
Athrho	0.4915***			0.4474*			0.4729**		
	(0.190)			(0.230)			(0.201)		
Lnsigma	-0.1482**			-0.1610**			-0.1544**		
	(0.059)			(0.067)			(0.061)		
Observations	26,694	26,694	26,694	26,694	26,694	26,694	26,694	27,204	27,204

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; [a]NC16 is the number of children under 16

Table A4: Sample Selection Corrected Results, by Year (extended specification with years of education)

	2000			2001			2002			2003			2004		
VARIABLES	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Eq: lnw1m															
Education	-0.0987***	0.0150	0.1656***	0.0679***	-0.0005	0.1298***	-0.0011	0.0187*	0.1565***	0.0446**	0.0021	0.1763***	-0.0411**	0.0355***	0.1774***
	(0.017)	(0.011)	(0.011)	(0.017)	(0.010)	(0.011)	(0.017)	(0.010)	(0.012)	(0.019)	(0.010)	(0.010)	(0.017)	(0.009)	(0.010)
Female	-0.5510***	-0.4612***	0.0369	-0.2903**	-0.3755***	0.0851	-0.2865**	-0.2453*	0.2683***	-0.5257***	-0.5463***	-0.0202	-0.5471***	-0.4754***	0.0705
	(0.121)	(0.105)	(0.094)	(0.122)	(0.110)	(0.098)	(0.136)	(0.127)	(0.097)	(0.090)	(0.088)	(0.089)	(0.104)	(0.098)	(0.090)
Experience	-0.0534***	0.0033	0.0817***	0.0487***	0.0019	0.0893***	-0.0145	-0.0028	0.0899***	0.0148	0.0004	0.0596***	-0.0158	0.0138	0.0684***
	(0.012)	(0.010)	(0.008)	(0.014)	(0.010)	(0.008)	(0.015)	(0.012)	(0.009)	(0.010)	(0.008)	(0.008)	(0.012)	(0.009)	(0.008)
Experience2	0.0008***	-0.0001	-0.0013***	-0.0010***	-0.0002	-0.0016***	0.0002	-0.0000	-0.0016***	-0.0003	-0.0001	-0.0010***	0.0001	-0.0003*	-0.0010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Marriage	0.0712	0.1701*	0.1708*	0.3016***	0.2340**	0.1712*	0.4466***	0.4750***	0.2977***	0.1508*	0.1460*	0.0478	-0.0140	0.0329	0.1090
	(0.110)	(0.093)	(0.090)	(0.107)	(0.098)	(0.089)	(0.134)	(0.128)	(0.094)	(0.086)	(0.084)	(0.088)	(0.094)	(0.089)	(0.089)
Female*Marriage	0.2717*	-0.0488	-0.4310***	-0.6266***	-0.4344***	-0.4199***	-0.3893**	-0.4760***	-0.6616***	-0.1846	-0.1103	-0.3105***	-0.0071	-0.1735	-0.3774***
	(0.144)	(0.125)	(0.100)	(0.144)	(0.123)	(0.106)	(0.161)	(0.139)	(0.097)	(0.118)	(0.108)	(0.099)	(0.123)	(0.112)	(0.098)
Urban	-0.1047	0.1689**	0.4179***	0.4503***	0.2734***	0.3874***	0.1175	0.1713***	0.4427***	0.2235***	0.1041*	0.5121***	-0.1088	0.0627	0.3927***
	(0.083)	(0.067)	(0.057)	(0.069)	(0.057)	(0.055)	(0.074)	(0.065)	(0.062)	(0.078)	(0.062)	(0.058)	(0.071)	(0.056)	(0.056)
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Children under 16, NC16		-0.0135	-0.0221		-0.0033	0.0056		-0.0013	-0.0101		-0.0164	0.0648**		0.0180	0.0435
		(0.022)	(0.036)		(0.017)	(0.028)		(0.005)	(0.043)		(0.013)	(0.033)		(0.016)	(0.036)
Female*NC16		-0.0654**	-0.1065**		0.0821***	-0.1392***		-0.0105	-0.0826		0.0338	-0.1334***		-0.0332	-0.0802
		(0.031)	(0.052)		(0.025)	(0.045)		(0.012)	(0.059)		(0.021)	(0.045)		(0.021)	(0.050)
Constant	7.2753***			1.7660***			4.5575***			3.1846***			6.3308***		
	(0.404)			(0.489)			(0.510)			(0.496)			(0.475)		
Eq: selection															
NC16	-0.0186			0.0059			-0.0093			0.0635*			0.0368		
	(0.030)			(0.030)			(0.040)			(0.033)			(0.031)		
Female	0.1233			0.1512*			0.3001***			0.0795			0.1468*		
	(0.087)			(0.089)			(0.091)			(0.082)			(0.080)		
Female*NC16	-0.0899**			-0.1457***			-0.0763			-0.1306***			-0.0678		
	(0.044)			(0.045)			(0.054)			(0.045)			(0.042)		
Education	0.1562***			0.1214***			0.1448***			0.1642***			0.1565***		
	(0.010)			(0.010)			(0.011)			(0.010)			(0.009)		
Experience	0.0779***			0.0831***			0.0856***			0.0556***			0.0604***		
	(0.007)			(0.008)			(0.008)			(0.007)			(0.007)		
experience2	-0.0012***			-0.0014***			-0.0015***			-0.0009***			-0.0009***		
	(0.000)			(0.000)			(0.000)			(0.000)			(0.000)		
Marriage	0.1354			0.1197			0.2061**			0.0186			0.0958		
	(0.087)			(0.088)			(0.095)			(0.083)			(0.081)		

Female*Marriage	-0.4355***			-0.3381***			-0.6219***			-0.2849***			-0.3376***			
	(0.107)			(0.111)			(0.115)			(0.102)			(0.099)			
Urban	0.3752***			0.3135***			0.3918***			0.4617***			0.3506***			
	(0.055)			(0.051)			(0.058)			(0.053)			(0.050)			
Regions	yes			yes			yes			yes			yes			
Constant	-3.5981***			-3.1946***			-3.6476***			-3.6606***			-3.5195***			
	(0.162)			(0.163)			(0.184)			(0.161)			(0.145)			
Athrho	-1.1257***			0.9170***			-0.2256			0.4176**			-0.8476***			
	(0.135)			(0.173)			(0.177)			(0.170)			(0.175)			
LnSigma	0.1393***			-0.0026			-0.2380***			-0.1804***			-0.1043			
	(0.053)			(0.082)			(0.040)			(0.054)			(0.076)			
Observations	5,088	5,088	5,088	5,326	5,326	5,326	4,449	4,449	4,449	5,695	5,695	5,695	6,136	6,136	6,136	

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; [a]b_1 is the corrected education coefficient estimate; b_2 is the conditional marginal effect of education on the log of wages; b_3 is the unconditional marginal effect of education on the log of wages.

Table A5: Sample Selection Corrected Results for the Returns to Soviet and post-Soviet Education, by Year

	2000			2001			2002			2003			2004		
VARIABLES	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2	β	β_1	β_2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Ew: lnw1m															
Soviet educ	-0.1001***	0.0133	0.1654***	0.0664***	-0.0003	0.1298***	0.0015	0.0183*	0.1555***	0.0442**	0.0016	0.1770***	-0.0402**	0.0353***	0.1774***
	(0.017)	(0.011)	(0.011)	(0.018)	(0.010)	(0.011)	(0.016)	(0.010)	(0.012)	(0.019)	(0.010)	(0.010)	(0.018)	(0.009)	(0.010)
Post-Soviet educ	-0.0370	0.0488*	0.1329***	0.0413	0.0082	0.0661**	0.0125	0.0213	0.0830***	0.0399	0.0151	0.1057***	-0.0107	0.0303	0.0984***
	(0.034)	(0.028)	(0.025)	(0.032)	(0.030)	(0.028)	(0.031)	(0.030)	(0.029)	(0.025)	(0.022)	(0.024)	(0.027)	(0.024)	(0.024)
Female	-0.5684***	-0.4676***	0.0523	-0.2834**	-0.3755***	0.1032	-0.2830**	-0.2442*	0.3003***	-0.5239***	-0.5513***	0.0081	-0.5470***	-0.4682***	0.0903
	(0.121)	(0.105)	(0.094)	(0.122)	(0.111)	(0.100)	(0.135)	(0.126)	(0.099)	(0.090)	(0.087)	(0.089)	(0.104)	(0.099)	(0.090)
Experience	-0.0255	0.0180	0.0661***	0.0342*	0.0062	0.0557***	-0.0068	-0.0015	0.0475***	0.0112	0.0098	0.0079	0.0082	0.0099	0.0055
	(0.017)	(0.015)	(0.013)	(0.018)	(0.015)	(0.015)	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)	(0.017)	(0.020)	(0.018)	(0.018)
experience2	0.0003	-0.0004	-0.0011***	-0.0008**	-0.0003	-0.0010	0.0000	-0.0001	-0.0009***	-0.0003	-0.0003	-0.0001	-0.0003	-0.0003	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(.)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Marriage	0.0692	0.1674*	0.1697*	0.2963***	0.2343**	0.1635*	0.4526***	0.4775***	0.3027***	0.1483*	0.1447*	0.0424	-0.0056	0.0382	0.1044
	(0.110)	(0.093)	(0.089)	(0.106)	(0.099)	(0.089)	(0.133)	(0.128)	(0.093)	(0.086)	(0.084)	(0.088)	(0.094)	(0.089)	(0.089)
Female*Marriage	0.2790*	-0.0450	-0.4358***	-0.6244***	-0.4388***	-0.4166***	-0.4014**	-0.4767***	-0.6683***	-0.1856	-0.1110	-0.3122***	-0.0129	-0.1760	-0.3752***
	(0.144)	(0.124)	(0.100)	(0.144)	(0.125)	(0.106)	(0.159)	(0.139)	(0.097)	(0.118)	(0.108)	(0.099)	(0.124)	(0.112)	(0.099)
Urban	-0.0973	0.1747***	0.4179***	0.4454***	0.2743***	0.3846***	0.1248*	0.1711***	0.4450***	0.2249***	0.1051*	0.5148***	-0.1060	0.0641	0.3951***
	(0.083)	(0.067)	(0.057)	(0.070)	(0.057)	(0.055)	(0.072)	(0.065)	(0.061)	(0.078)	(0.062)	(0.058)	(0.071)	(0.056)	(0.056)
Regions	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
NC16		-0.0135	-0.0221		0.0001	-0.0002		-0.0024	-0.0223		-0.0132	0.0524		0.0119	0.0292
		(0.022)	(0.036)		(0.016)	(0.028)		(0.005)	(0.043)		(0.012)	(0.033)		(0.016)	(0.037)
Female*NC16		-0.0675**	-0.1103**		0.0866***	-0.1511***		-0.0102	-0.0936		0.0372*	-0.1471***		-0.0383*	-0.0937*
		(0.031)	(0.052)		(0.025)	(0.046)		(0.012)	(0.059)		(0.022)	(0.045)		(0.022)	(0.050)
Constant	6.9373***			2.0019***			4.3884***			3.2395***			5.9795***		
	(0.422)			(0.476)			(0.465)			(0.485)			(0.484)		
Eqn: select															
Post-Soviet Educ	0.1185***			0.0605**			0.0751***			0.0963***			0.0853***		
	(0.024)			(0.026)			(0.027)			(0.022)			(0.021)		
Soviet Educ	0.1565***			0.1219***			0.1446***			0.1654***			0.1571***		
	(0.010)			(0.010)			(0.011)			(0.010)			(0.009)		
NC16	-0.0187			-0.0002			-0.0208			0.0514			0.0248		
	(0.030)			(0.030)			(0.040)			(0.033)			(0.032)		
Female	0.1391			0.1683*			0.3317***			0.1066			0.1639**		
	(0.088)			(0.091)			(0.094)			(0.083)			(0.081)		
Female*NC16	-0.0932**			-0.1583***			-0.0872			-0.1444***			-0.0797*		
	(0.044)			(0.047)			(0.055)			(0.045)			(0.042)		
Experience	0.0601***			0.0512***			0.0454***			0.0057			0.0034		
	(0.013)			(0.014)			(0.015)			(0.015)			(0.016)		
Experience2	-0.0009***			-0.0009***			-0.0008***			-0.0000			0.0001		

	(0.000)			(0.000)			(0.000)			(0.000)			(0.000)			
Marriage	0.1351			0.1130			0.2124**			0.0138			0.0909			
	(0.087)			(0.088)			(0.095)			(0.083)			(0.082)			
Female*Marriage	-0.4420***			-0.3362***			-0.6340***			-0.2876***			-0.3364***			
	(0.107)			(0.113)			(0.117)			(0.103)			(0.100)			
Urban	0.3746***			0.3125***			0.3960***			0.4655***			0.3539***			
	(0.055)			(0.051)			(0.058)			(0.053)			(0.051)			
Regions	yes			yes			yes			yes			yes			
Constant	-3.3799***			-2.7751***			-3.1143***			-3.0063***			-2.7483***			
	(0.209)			(0.228)			(0.261)			(0.244)			(0.250)			
Athrho	-1.1210***			0.8886***			-0.1920			0.4155**			-0.8325***			
	(0.136)			(0.185)			(0.168)			(0.171)			(0.178)			
LnSigma	0.1364**			-0.0140			-0.2428***			-0.1811***			-0.1106			
	(0.054)			(0.086)			(0.037)			(0.054)			(0.077)			
Observations	5,088	5,088	5,088	5,326	5,326	5,326	4,449	4,449	4,449	5,695	5,695	5,695	6,136	6,136	6,136	

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; [a]b_1 is the corrected education coefficient estimate; b_2 is the conditional marginal effect of education on the log of wages; b_3 is the unconditional marginal effect of education on the log of wages.